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SOVIET DECISION MAKING IN DEFENSE R&D:

A CRITICAL ANALYSIS OF CURRENT PERSPECTIVES ON THE ROLES AND RELATIONSHIPS OF MIDDLE-LEVEL AND LOW-LEVEL PARTICIPANTS

130(2)

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August 1974

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Copy № 179

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AUGUST 1974

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This paper was prepared under Contract [redacted] Office of Scientific Intelligence, Central Intelligence Agency.

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SUMMARY

The study seeks to accomplish five objectives of which the third is the central one:

1. To indicate what is methodologically permissible in analyzing the R&D decisionmaking process in the Soviet defense sector.
2. To present an overview of current interpretations that particularly bear on an important aspect of this process: the roles and relationships of middle-level and low-level decisionmaking participants. These participants include the defense sector watchdogs of the Soviet leadership, leadership elements in the armed services and the defense-industrial ministries, and designers, research scientists, and military representatives.
3. To provide critical assessments of these current interpretations. The interpretations are criticized either for overstepping the bounds of what is methodologically permissible, or for failing to fully use the information they contain within these bounds. To conform to the methodological standards which the study presents at the outset, the study analyses are themselves presented only as hypotheses.
4. To present the implications that the hypotheses hold for future decisionmaking analyses of particular Soviet weapon system developments.
5. To illustrate how these implications, in fact, apply in a particular weapon development case study and to demonstrate their utility in addressing such key decisionmaking questions as how new weapon systems are initiated in the USSR.

The study maintains that a cautious building-block approach is the appropriate way to analyze Soviet R&D decisionmaking and enable this analysis to eventually contribute to an understanding of larger questions--such as the dynamics of the arms race between the two superpowers. This building-block approach emphasizes the need to gradually accumulate enough knowledge to permit valid generalizations

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about Soviet defense R&D decisionmaking. Such knowledge would accrue from a considerable number and variety of case studies of specific Soviet weapon system developments. The approach also emphasizes the need to be aware of conceptual biases that may result in the misuse of such information on Soviet R&D decisionmaking that presently exists and may be forthcoming in the future.

The study finds that current interpretations may have fallen short in exploiting existing information; in so doing they have produced assumptions that may prove misleading, particularly for analyses of future Soviet weapon system developments. Basic criticisms of these assumptions are given in the form of five hypotheses:

1. Current interpretations underestimate the management demands of modern complex weapon systems; thus, they tend to overstate the ability of the top Soviet leadership to supervise directly and competently ongoing weapon system developments.
2. Current interpretations have tended to abstract the defense sector from the larger Soviet political context. As a consequence, a discrete political control factor in Soviet defense R&D decisionmaking, which may place important constraints on the watchdogs of the defense sector and affect design competition, has been submerged.
3. Current interpretations present a picture of design conservatism and the existence of an urge toward state-of-the-art technological advances in the Soviet defense sector that is basically contradictory. To remove this contradiction for purposes of validly determining the initiator of technologically conservative or "adventurous" weapon systems, a variety of factors affecting the specific relations among designers, research scientists, and Service personnel require explicit attention.
4. Current views about the pervasive impact of a "constant shares" principle in the Soviet defense sector are overstated. The emphasis on a fairly steady and "equitable" apportionment of resources minimizes the significant breaches of this principle that have occurred on both the Service and defense-industrial side of the equation. In so doing, such features of the defense sector as the interdependence of the defense-industrial ministries and the strained relations between ministers and deputy ministers, which may be particularly important in the future, have been slighted.

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5. Current interpretations of Soviet R&D decisionmaking tend to adopt a view of possible interest-group relationships in the Soviet defense sector that rests on incorrect assumptions about the nature of the Soviet defense-industrial ministries. This view stresses a one-on-one relationship between a given Service and defense-industrial ministry. And it comes close to treating the defense-industrial ministries as monolithic entities, equating their interests in particular weapon systems with the interests of the relevant Services. Consequently, efforts to determine interest-group activity in the Soviet defense sector are left with little basis for properly appreciating such key considerations as the differences in intensity of interest in a particular weapon system, possible sources of opposition, the relative power of "interested" parties, etc.

The implications these hypotheses hold for analyzing particular weapon system developments add up to two needs. One is to take into account certain organizational features hitherto slighted or obscured. The other need is to pose certain questions about these developments that seem to be absent from the considerations of current analyses or to have been given low priority. According to the hypotheses, one might expect to find, particularly in the development of future weapon systems, such organizational features as:

- Mutual assistance among a number of defense-industrial ministries
- A larger coordinating and management role for inhouse elements to take up the slack left by the defense sector watchdogs
- Possible efforts to play the various watchdogs against each other on the part of those who are "supervised" by these watchdogs
- A particularly active role for military representatives and deputy ministers
- Increased reliance on "outside" elements such as research scientists attached to the Academy of Sciences.

The questions that the hypotheses suggest should be posed basically relate to (1) a determination of the initiation of technologically conservative or "adventurous" weapon system programs and, (2) possible interest-group activity in the initiation of new weapon programs. With regard to (1) the hypotheses suggest that questions

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should be raised about the relationship of defense-industrial research scientists and design shop personnel as well as about the relationship of design shop personnel and the Service customer. The questions are designed to elicit information concerning communications between the involved parties and their relative power and weapon interests. The questions that should be raised with respect to (2) are designed to bring out differences in the intensity of interest in a given program at the defense-industrial ministry level and at the design bureau and research institute level of the participating defense-industrial ministries. These differences are crucial in determining whether Service and defense-industrial ministry interests are roughly comparable for a given weapon system. They are crucial in determining whether subordinate elements in a defense-industrial ministry might expect to find actual opposition to the program on the part of other subordinate elements or at the ministry-level. And, if this is so, the differences are crucial in determining whether the subordinate elements might have a particular need to engage in interest-group activity with Service elements and try to override such opposition.

The organizational features highlighted by the hypotheses and the questions they elicit are "tested" in a case study (not included in some copies for classification reasons) of the development of an "exotic" weapon system that broadly represents future Soviet weapon system development programs. The study emphasizes that a single case cannot test all the hypotheses that have been generated or even thoroughly test one of these hypotheses. Nevertheless, it finds that --data gaps notwithstanding--the hypotheses are useful and generally valid. They can help to determine how a new weapon system is initiated, whether interest-group activity plays a part in such initiation, and how effectively the development program of a modern weapon system is managed and its elements coordinated. In keeping with the methodological premises of the overall study, it is acknowledged that a firm verification of the hypotheses requires similar case studies of programs in a wide variety of weapon areas.

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I. PROBLEMS IN ANALYZING R&D DECISIONMAKING IN THE SOVIET DEFENSE SECTOR--AN INTRODUCTION

"We just do not have an adequate explanatory model for the Soviet-American arms race." (Ref. 1)

A. THE LARGER CONTEXT OF THE STUDY: WHY ANALYZE SOVIET DEFENSE R&D DECISIONMAKING?

It is a cherished hope that an important by-product of the SALT experience will be an improved understanding by both parties of each other's strategic perspectives and domestic constraints. It is particularly hoped on the U.S. side that the Soviet Union will receive a lesson in strategic thinking that will at least help to put it on the same wavelength as the United States in calculating the rewards and penalties of future Soviet weapon deployments.* Implicit in this perhaps unrealistic hope, is the admission that in the past the USSR's development of its strategic arsenal was not fully comprehensible by U.S. standards.

The foremost casualty of such an admission is the long-held theory that the arms competition between the two superpowers can be satisfactorily explained as a simple action-reaction phenomenon, whereby each side determines its weapon deployments on the basis of what is needed to counter the actual or expected deployments of the other. In its simplest form, this theory focuses solely on international stimuli to the development and deployment of weapon systems

*An interpretation of the Soviet agreement to the ABM treaty, which holds that the Soviets had already learned much up to and during SALT I, is discussed in Ref. 2.

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and depends for its credibility on a correlation of the timing and characteristics of the designated U.S. and Soviet "companion" systems.

Because of its preoccupation with the international dynamic, and its assumption that the United States and the USSR can be regarded as mutually interchangeable "players," the action-reaction theory attaches little importance to an explicit examination of the similarities and differences between the weapon systems decisionmaking processes of the two countries. This particular deficiency has led in recent years to the development of alternative theories. In the words of one student of these theories:

> The newer proposition holds that the arms race behavior of the state-actors is determined not so much by the perception of threat, as by "the games that bureaucrats play." The range of models for the elucidation of this proposition is formidable indeed. At one extreme, analysts devise an action-reaction model wherein the principal actors are the U.S. Air Force, Navy and Army--competing with a somewhat astrategic budget ceiling, and with the Soviet Union performing an essential game legitimization function (Ref. 3).

While the conclusions offered by extreme proponents of this new "bureaucratic" approach may prove to be as wide of the mark as the explanations of the arms race yielded by the action-reaction theory, this approach as a whole has at least highlighted the area within which the first questions about Soviet and U.S. strategic arms behavior should be posed. In other words, determining whether and to what extent international stimuli dictate the weapons policies of either the United States or the USSR requires an understanding of the workings of their respective weapon system decisionmaking processes.

Since issues of fundamental importance to the security of the United States are involved in these larger determinations, the effort to understand the decisionmaking processes in the Soviet defense sector represents something more than a search for knowledge for its own sake. As a clue to the enormity of the problem, it is useful to

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keep in mind that on the U.S. side of the strategic equation, an understanding of the U.S. weapons acquisition process is still far from complete. On the Soviet side, the lack of adequate data on the workings of the defense sector makes the hope for a breakthrough in understanding the arms race even more remote. The task ahead for those analyzing the Soviet defense sector may be likened to an archeological dig. At the present stage of the dig, a few scattered potsherds have been unearthed. These may yield some important insights, but surely not enough to permit an adequate understanding of the behavior of the site's inhabitants. Indeed, there seems to be no substitute for the careful and patient digging needed to accumulate sufficient artifacts to make such an understanding possible. The most that this study can reasonably aspire to is to shed a bit more light on those artifacts that have already been found and to indicate where future excavations may prove fruitful.

B. SELECTING AN APPROACH

1. The Problem of Coverage

If it is prudent to fight shy of any hard and fast general theory of the arms race between the two superpowers until both of their overall weapon systems decisionmaking processes are better understood, so too prudence dictates a cautious building block approach within the confines of these processes on either side. Accordingly, this study does not seek to provide either a general interpretation of the Soviet weapon systems decisionmaking process, or even a comprehensive explanation of R&D decisionmaking as a whole within that process. Rather, it focuses on a single facet of Soviet defense R&D decisionmaking, the roles and relationships of middle-level and low-level participants in defense R&D. These are the people most intimately concerned with weapons R&D in the USSR. The middle-level ranks include leadership elements in the services and the defense-industrial ministries and the organizations and personnel that are charged with monitoring and coordinating weapon system

development programs. The ranks of the low-level participants include weapon systems designers, research scientists, and service representatives.

Two caveats concerning the coverage of this study must be noted. The first is that the line between middle-level and high-level participants cannot be too sharply drawn. Clearly, no account of the monitoring and coordinating activities in Soviet defense R&D can afford to avoid explicit consideration of the role of Dimitri Ustinov, for example, who, given his expertise and position as a candidate member of the Politburo, also is involved in high-level decisions on weapons R&D and defense policy generally.

The second caveat concerns a more fundamental methodological problem. A study of this sort can be approached in several different ways, each of which has particular merits and shortcomings. One way of examining the roles and relationships of middle-level and low-level participants in the Soviet defense R&D decisionmaking process would be to elucidate those roles and relationships as they are manifested in the development of a single weapons system. The merit of this ease approach is that it stands a good chance of being as methodologically rigorous and valid as the peculiar nature of the Soviet defense sector allows any analysis to be. If a case is carefully chosen, the analyst may be able to support his arguments with a "substantial" amount of empirical evidence. The deficiency of the single-case approach is that its narrow focus may produce only very limited insights. Since the representative nature of the case cannot be taken for granted, there is no way of knowing whether and to what extent the insights revealed by the case may apply beyond it.

Another approach would be to present a general treatment of the subject matter. The roles and relationships of middle-level and low-level participants in Soviet defense R&D decisionmaking could be analyzed simply by extrapolating from broad-ranging analyses of the overall Soviet defense R&D decisionmaking process. The merit of this approach is that it keeps the subject matter of the study in

perspective by relating it to the larger decisionmaking context and at the same time opens the way for an exploration of important relevant issues that a single case may not reveal. The shortcoming of this approach is that the conclusions it produces fall far short of the methodological rigor and validity that direct empirical verification makes possible. Since this general approach is at second remove from the evidence on which the analyses of the overall decisionmaking process are based, it must assume that the analyses have been validly derived from the evidence. Even if this assumption should be correct, a methodological dilemma may be encountered. If the analyst seeks to make bold extrapolations from the analyses, to convey as many new insights as possible, he may go far beyond what the evidence underlying those analyses will sustain. If, on the other hand, he is cautious, the whole exercise might be sterile. At best, his conclusions would be heavily prejudged by the analyses of the overall decisionmaking process that he used as his point of departure. At worst, his conclusions would be superfluous in terms of shedding new light on the workings of the decisionmaking process.

Given the difficulty of securing adequate data about the Soviet environment--and particularly about the setting in which the decisions on Soviet weapons are taken--the goal of methodological purity must inevitably be compromised if efforts to understand Soviet decisionmaking processes are not to come to a halt. It is important, nevertheless, for the analyst to be aware of when and where compromises are made and to what extent he is making them.

In this study, a methodologically ideal approach is clearly impossible. Such an approach would call for a series of case studies of the roles and relationships of the middle-level and low-level participants in decisionmaking on particular weapon system developments. It would also call for a direct analysis of the evidence bearing on many aspects of the overall decisionmaking process so that the conclusions reached in the case studies could be properly related to the larger decisionmaking context. Failing this, the study should

adopt an approach that represents a middle ground between the approaches discussed above. The coverage of the study should be sufficiently broad to shed new light on the overall decisionmaking process. At the same time, it should be sufficiently detailed to facilitate an empirical verification of the study's conclusions.

Determining the appropriate coverage of a study of this sort is only one part of the methodological problem that has to be confronted. The other part has to do with the concepts that the study utilizes to illuminate the subject matter on which it focuses.

2. The Problem of Concepts

The task of devising a fruitful and valid approach for a study of this sort involves an appreciation of a variety of potential biases to which almost any examination of Soviet weapons decisionmaking may fall prone. This particular susceptibility to biases of analyses of Soviet weapon decisionmaking problems is no doubt basically due to the murky nature of the subject. Because the data are both scant and spotty, it becomes tempting to apply uncritically concepts and notions derived from other settings and to generalize from limited and possibly unique examples. Although no approach can reasonably claim to be bias free, it is incumbent on the analyst to attempt to take into account, and make explicit allowance for, those biases that pose the most obvious challenges to the credibility of his conclusions. For ease of discussion, the bias dangers that this study will be particularly wary of have been grouped into three categories: those that may stem from U.S. and other Western (weapons) decisionmaking theories; those that may issue from notions of decisionmaking in the Soviet civilian sector; and those that may inhere in interpretations of particular Soviet weapon decisionmaking experiences.

a. Bias Problems Associated with U.S. Weapon Decisionmaking Theories. Of the various theories of bureaucratic decisionmaking that have come to the surface in recent years as putative successors to the action-reaction approach to analyzing Soviet-U.S. relations,

none has been more sophisticated or better articulated than those advanced by Graham Allison. In brief, Allison puts forth two alternative paradigms as devices to explain Soviet and U.S. strategic policies--the "organizational process model" and the "bureaucratic politics model"--which he considers either separately or in tandem as inherently more fruitful and accurate than what he refers to as the "rational policy paradigm," (Ref. 4).

Allison regards the rational policy paradigm as the implicit model used by most U.S. strategic analysts in the past. This model accepts individual governments, per se, as the relevant policymaking actors and operates according to the dictum that "to explain an occurrence in foreign policy simply means to show how the government could have rationally chosen that action" (Ref. 4, p. 50). By contrast, the organizational process model sees the foreign policies of states as being largely the product of the specific interests and established behavior patterns of the various organizations "on top of which government leaders sit" (Ref. 4, p. 57). The bureaucratic politics model in turn focuses attention on the personalities who head up those organizations and views foreign policies as being heavily determined by the individual political skills of these personalities in pressing their own and their organizations' interests (Ref. 4, pp. 69-73).

Allison's theoretical contribution, particularly his distinction between organizational interests and routines, on the one hand, and the personal interests and political skills of the individuals who head organizations, on the other, has potential utility for analyzing Soviet defense R&D decisionmaking, as will be discussed later. For the present, however, what is significant is that Allison's models embody a number of methodological snares. In the first place, the data requirements for the bureaucratic politics model seem sufficiently formidable even on the U.S. side, to preclude easy transfer to the Soviet defense sector, about which data are in short supply.

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Perhaps even more important is the cautionary message that lies in an amplification of Allison's criticisms of the rational policy paradigm. The weakness of the rational policy paradigm is not only that it is questionable whether states invariably or mainly act as monolithic policymaking entities guided by a "rational" calculus of what they seek to achieve vis-a-vis other states, but also that this model presupposes a universal standard of rational behavior. One should at least be mindful that what is irrational in the light of U.S. experience is not necessarily irrational in the eyes of Soviet policymakers. Indeed, perhaps the very search by U.S. analysts for alternatives to the rational policy paradigm has been stimulated by the fact that from a U.S. perspective certain of the Soviet actions in the past have appeared "irrational."

Emphasizing this quite obvious point about national differences adds up to something quite different from a mere reinforcement of Allison's criticism of the rational policy paradigm. Because the dangers inherent in assuming that Soviet policy is calculated according to U.S. standards of rationality are supposedly avoided by using methods other than this paradigm, the broader relevance of this danger may be missed. That is, a credible approach to Soviet R&D decisionmaking must be wary of resting its conclusions on an uncritical acceptance of the applicability to the Soviet side of either U.S. organizational behavior or the political behavior of the individuals in the United States who head up the organizations. Allison himself has given perhaps the most vivid example of what an incautious acceptance of his alternative models may lead to by stating (in 1969, to be sure) that, according to the organizational process model, the Soviet Union would be unlikely to come to an ABM agreement with the United States (Ref. 4, p. 83).*

*This estimate was largely based on an apparently mistaken evaluation of the PVOs (Soviet National Air Defense forces) ABM capability and/or the PVOs political clout.

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By way of briefly illustrating the necessity for avoiding the pitfalls of hastily reading Soviet defense R&D decisionmaking in U.S. terms, a few additional examples follow. Michael Armacost, in his study, The Politics of Weapons Innovation, has detailed the competition between the U.S. Air Force and U.S. Army in the development of an IRBM. In order to apply Armacost's insights about the organizational characteristics and technological implications of service rivalry to the Soviet side, it would be necessary at a bare minimum to make appropriate allowances for the fact that the primary conditioning factor of this rivalry was that it was above all a competition for a mission role (Ref. 5). Any generalization about Soviet Service rivalry on the basis of Armacost's analysis would therefore obviously first have to take into account whether such competition was present--and to what extent--for the Soviet weapon R&D programs being examined.

A similar caution is warranted in trying to illumine the behavior of Soviet "defense contractors" with insights gained from analyses of U.S. organizational behavior in defense R&D. For example, one recent theory advanced as an explanation for the selection of weapon systems and weapon systems contractors in the United States holds that:

> ...if one of the eight (aerospace) production lines is opening up, it will receive a new major contract from a military service.... Ordinarily, the new contract will be structurally similar to the old, i.e., a follow-on contract. Relatedly, a design competition...is only a peripheral factor of the award (Ref. 6).

However accurate or inaccurate such an interpretation of U.S. weapons procurement incentives may be, clearly any transfer of this notion to Soviet soil would have to take into account a host of organizational peculiarities in the Soviet defense-industrial environment, most importantly, the special funding patterns and incentive structures built into a high-priority sector of a planned economy.

Finally, in a view of the weapons system selection process that conflicts somewhat with the interpretation given above, the authors

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of another study assert a strong incentive by industrial contractors for "state-of-the-art" advances in weapons technology on the following grounds: "Contractor operating executives realize that increasing quality can seldom hurt the production follow-on potential of their product and will often help it (Ref. 7). Again, whether this sort of incentive makes much sense in the Soviet environment can of course only be judged on the basis of an understanding of the special economic dictates imposed by the Soviet planning system on the high-priority defense-industrial ministries.

None of the above words of caution about the utility of U.S.-derived models in analyzing Soviet R&D decisionmaking is intended to suggest that the Soviet R&D decisionmaking process is so totally unique as to defy illumination by insights gained from analyses of the U.S. experience in this area. Clearly, no U.S. analyst could attempt a meaningful description of the Soviet process, much less compare it with the U.S. process, if that was the case. The ubiquitous nature of the purely technical factors impinging on defense R&D decisionmaking would alone make this conclusion unwarranted. To be sure, just as it would be improper from a methodological standpoint to force Soviet defense R&D decisionmaking into a U.S. mold, so too it would be improper to dismiss U.S. experiences out of hand because the Soviet weapons decisionmaking environment has certain special characteristics.

The principal utility of insights derived from U.S. weapons would seem to be in pointing to areas of investigation--problems, relationships, and the like--that should be explored on the Soviet side but which are not readily suggested by the Soviet data themselves. This utility would be vitiated, however, if the concepts or theories taken from the U.S. weapons decisionmaking experience were given a more prominent role as either substituting for the data they are supposed to illuminate or being the sole determinants of which data are to be examined. It would be no more credible to assume, for example, citing an earlier illustration, that the Soviet defense

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industries shy away from "state-of-the-art" advances in weapons technology, mainly or only because they have no concern for follow-on potential, than that they have a contrary urge primarily because of such potential, i.e., for the same basic reason as U.S. defense contractors.

b. Bias Problems that Stem from Interpretations of the Soviet "Civilian" Decisionmaking Environment. If it is incumbent on the analyst to be wary of reading Soviet defense R&D decisionmaking in U.S. terms, it is also necessary to be cautious about depending on information and concepts gleaned from Soviet decisionmaking practices in the civilian sector to provide the keys to the defense sector. There are basically two types of pitfalls to be avoided in this regard: relying on evidence of the existence of certain organizational practices and behavior in the civilian sector as a substitute for direct evidence on the defense side; and being insufficiently attentive to the special conditions of the defense R&D situation within the Soviet environment in utilizing civilian decisionmaking concepts to evaluate such evidence as does exist on the defense side.

The first of these pitfalls is evidently a product of the scant and spotty data about Soviet defense R&D--especially unclassified data. As a consequence of the data problem, it becomes tempting to assume that organizational practices discernible in the civilian sphere also apply in the defense sector. In his analysis of planning and management innovations in the Soviet civilian economy, for example, Robert W. Campbell attempts to demonstrate that Soviet space and military efforts have had a spillover effect on management techniques in the civilian economy. In the process, Campbell focuses on several areas of management innovation which, although not widespread, are at least being bandied about in the Soviet civilian economic sector--the systems concept, new methods of quality control (the Saratov system, KANARPSI), and reliability assurance and network methods (Soviet versions of Program Evaluation and Review Techniques, PERT, and Critical Path Method, CPM) (Ref. 8, passim).

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Because of the evident applicability of such management and planning techniques to weapons decisionmaking--at least by U.S. standards--Campbell deduces their widespread and successful use in the Soviet defense sector (Ref. 8, p. 606).

Whether or not Campbell happens to be correct is, of course, entirely beside the point here.* What matters is that if he is correct it is only by chance. Without a systematic and direct survey of Soviet weapons decisionmaking practices, which is not evident in his study, his conclusions about the use of the management techniques in the defense sector are hardly warranted on the basis of deductions drawn from an observation of the emergence of these techniques in the Soviet civilian economic sector.

Another illustration of this methodological snare is that provided by David Granick's extrapolation of Soviet defense and space R&D practices from information he has gleaned about Soviet behavior in the metal-fabricating industry. Taking into account what he has observed about the differences between U.S. defense R&D practices and Soviet R&D practices in the civilian metal-fabricating context, Granick contrasts the U.S. bias toward an experimental approach to development problems in defense R&D with what he posits as characteristic of both Soviet civilian and space-defense R&D--a theoretic approach. As he puts it:

> One would expect that research and development scientists in the Soviet Union would be considerably more likely than those in America to prefer the first (i.e., theoretic) approach, and that their first efforts at the solution of any problem would be theoretic. Such preference would be dictated both by the Russian cultural bias and by the different factor proportions existing in the two countries (Ref. 9).

*As a matter of fact, the Soviets have given some hints of the use of such management and planning techniques in the defense sector. For one such hint, see V. D. Skugarev and L. V. Kuden, Critical Path Planning in the Navy, Joint Publications Research Service Report No. 61732 (April 11, 1974). Surely, a case for the widespread use and success of CPM, let alone other similar techniques, requires much greater substantiation than the partial and "unclassified" pronouncements of such Soviet spokesmen.

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As with Campbell's study, there may be some truth in what Granick says about Soviet R&D approaches. Nevertheless, whatever credibility may attach to his conclusions, concerning the preference for a theoretic approach in the metal-fabricating industry, can hardly be extended automatically to similar conclusions about Soviet defense R&D. Not only does his analysis pay scant attention to the special priority status and customer relations that affect the various components of the Soviet defense industries as a whole, but it takes no account whatsoever of what may be a particularly important determinant of the preference for theoretic or experimental approaches in Soviet defense R&D--the peculiar role of Soviet designers and their relations with research institute personnel.

If the methodological deficiencies illustrated above can be said to stem primarily from the effort to find surrogates for direct evidence about the workings of Soviet defense R&D, the second type of pitfall derives from the ordering and evaluation of direct evidence when it is secured. The principal potential offender in this case is the interest-group approach to Soviet politics. As a corrective to the long-held totalitarian model of Soviet policymaking, interest-group analyses have clearly played, and should continue to play, a useful and necessary role. They have illuminated both the conflicts and bargaining that occur at the top levels of Soviet decisionmaking and, more particularly, the incentives and leverage that groups further down the decisionmaking ladder may have in influencing the decisions reached at the top.

At present, the interest-group approach, even as applied to civilian policy matters in the USSR, is confronted with a basic task. In the face of objections that it is to a large extent a forced transplant from the soil of Western pluralistic democracies, this approach must demonstrate its general methodological validity by adumbrating a sufficient array of rigorous concepts that are sensitive to the Soviet setting.* In meeting this objection, a number

*For one analysis that effectively points out the manifold difficulties involved in transplanting interest-group analyses to Soviet soil, see Ref. 10.

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of important analytical distinctions have been made that make sense in the Soviet political environment.* These include a contrast between mere interest-group existence and actual interest-group influence, a differentiation between issue-oriented and organization-oriented groupings, a distinction between the impact of institutionally exerted influence and individual influence, a discrimination between successful and unsuccessful timing of interest-group activity relative to the involvement of the party leadership in the issues considered, and so on.

However much progress the establishment of these conceptual distinctions may represent in analyzing some areas of Soviet policymaking, the interest-group approach still has a long way to go before it can be relied upon as a bona fide model for determining the nature and extent of Soviet interest-group activity generally. The methodological snare inherent in this approach issues directly from its partial successes as a new way of looking at Soviet political life. It becomes tempting to assume that the conceptual distinctions and criteria that have been convincingly applied in some areas of Soviet policymaking are also appropriate and adequate in examining others--particularly those involving the defense sector.

Beyond the slippery problem of even identifying interest groupings in the defense sector on the basis of certain presumed characteristics and attitudes (Ref. 14),** there is also the problem of determining appropriate indicators of interest-group activity. An example of how interest-group analyses applied successfully in other areas of Soviet policymaking may prove misleading or inadequate in the defense sector is provided by Stewart's evaluation of the repeal

*These distinctions and others emerge from such analyses as those given in Refs. 11, 12, and 13.

**Although overstated, Odom's analysis of the tenuous assumptions on which the basic distinction between party and military interests rests is a useful critique in this regard.

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of production education in the Soviet civilian sector during Khrushchev's tenure. One of Stewart's key conclusions is that "individuals and groupings may publicly solicit support for alternative policy proposals from other individuals, institutions, or groupings," (Ref. 12, p. 47). To be sure, for anyone who has kept tabs on the different treatment accorded military and foreign policy issues by Pravda and Red Star from time to time, the publicity criterion can hardly be regarded as totally inappropriate in examining interest-group activity in the Soviet defense sector. It is certainly doubtful, however, given the Soviets' unusually tight security on weapon systems information, that public debate can give as accurate or complete a picture of the relevant interest-group activity in this domain as it can in such areas as educational reform.*

This is not to say that the workings of the Soviet defense sector--particularly defense R&D--hold no reflection of the larger Soviet political, economic, and scientific environment. After all, the Soviet leaders in the civilian sector whom interest groups may wish to influence are also the ultimate decisionmakers that interest groups in the defense sector have to try to influence as well. Indeed, even if the arena of maximum interest-group impact and activity in the defense sector should prove to be at a level below that of the top leadership, those who are "influenced" at that level are likely to be conditioned in their responses by concerns for what the traffic will bear at the top. Similarly, however special the situation of the defense industries may be in terms of their priority status in funding, manpower, and the organizational practices these permit, that situation can hardly be regarded as having no characteristics in common with the civilian industries which

*There is probably no more vivid indicator of the Soviet attitude on this score than that provided by an after-hours encounter between Colonel-General Ogarkov and a U.S. delegate during SALT I. At this encounter, the former admonished the U.S. for revealing information about Soviet weapons to the Soviet civilian delegates (Ref. 15).

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operate with them under the same planning mechanism. The point is, nevertheless, that considerable care must be taken both in filling in the data gaps in the Soviet defense sector by extrapolations from the civilian side and in ordering and weighting data about the workings of the defense sector by utilizing "models" that have been fleshed out with concepts suggested by civilian policymaking practices.

In attempting to strike a workable balance between acknowledging and overdrawing the distinctions between the Soviet civilian and defense sectors, the errors associated with extrapolating from the Soviet civilian scene are probably easiest to avoid. There is an aspect of this approach--a "negative" extrapolation--that, nevertheless, requires as much conscious attention on the part of the analyst as the application of Soviet "civilian" models to defense R&D. If one must exercise caution in keeping the focus of the interest-group approach appropriate to the subject, one must also be wary of assuming that, against the general background of Soviet defense R&D success, inefficient or wasteful practices in the civilian sector automatically denote the opposite in defense.

c. Bias Problems Associated with Analyses of Particular Soviet Weapon Systems Decisions. Assuming that the analyst of Soviet defense R&D decisionmaking exercises caution in applying concepts and theories taken from the U.S. weapons procurement environment and the Soviet civilian policymaking setting, there is still another source of potential bias to which he must be attentive. If anything, this bias danger--the temptation to generalize from what may be only a reasonable picture of decisionmaking practices in the case of certain weapon systems--may be the most insidious of all, precisely because it is embodied in interpretations that emphasize, and address themselves pointedly to, the special characteristics of the Soviet defense sector.

The uneven nature of the data--certainly the unclassified data--on the Soviet defense sector is undoubtedly a major contributor to

[redacted]

this temptation. Taking comfort in the weight of the available evidence, it is easy to adopt a stance that implicitly assumes that the conclusions reached on decisionmaking practices in areas about which the data base is comparatively rich are generally valid for Soviet weapons and defense R&D decisionmaking as a whole. The weapons system area that seems most likely to support this tendency to generalize is the area of Soviet military aircraft development. This is an area that has yielded perhaps the richest source of information on Soviet weapons decisionmaking, even on an unclassified level.

The analysis by Alexander (Ref. 16) is indicative of the temptation to generalize. Although acknowledging his deliberate focus on aircraft, Alexander nevertheless feels justified in using it to draw a picture of Soviet weapons decisionmaking as a whole.* Such features as endemic design competition, a tendency to shy away from pushing "state-of-the-art" technological advances in the interest of achieving simple, reliable, and time-sensitive designs, and, above all, the preeminent role of the designer emerge as characteristics of a general Soviet approach to weapons R&D.

Obviously to suggest that sweeping conclusions of this sort cannot really stand on the evidence provided by one area of weapon systems decisionmaking is not to imply that many of these conclusions may not turn out to be substantially accurate. Rather, it is to emphasize that, unless and until comparable information is available on the decisionmaking processes affecting a wide range of other Soviet weapon systems, the above view or any other view** of Soviet weapons

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*This is clearly implied in the title of the study and is explicitly set out in the study's conclusions (Ref. 16, pp. 28-31).

**Even without substantial reflection, a serious deficiency in Alexander's model seems apparent that would disqualify it as "the" aircraft decisionmaking model in this regard--no substantial account is given of the customer's role and impact.

In dealing with other aspects of aircraft decisionmaking, however, Alexander's model may be on safer ground. For one confirmation of his views (as similarly expressed in an earlier study, Ref. 17), see Ref. 18.

decisionmaking based principally on the development of aircraft should be recognized as such.

Just as it is important to be wary of hasty generalizations from the evidence of aircraft decisionmaking practices, so too, it is necessary to be cautious about generalizing from practices observed in other weapons areas. If, as a broad methodological principle, the special character of the Soviet weapons decisionmaking environment must be kept in mind (vis-a-vis U.S. weapons procurement and Soviet civilian policymaking), so too it is necessary to be attentive to whatever conditions or circumstances may make the process associated with a particular weapons system special.

One must also be careful of letting "aircraft decisionmaking models" determine the selection and evaluation of data on the processes affecting the development of other weapon systems. To assume, for example, that the heavy hand of a chief designer must be present where no heavy hand can really be confirmed by the evidence, or to slight the evidence attesting to a determined effort to push the state-of-the-art technologically would be to confirm the model at the expense of new insight. By the same token, it must be acknowledged that, if treated judiciously, "aircraft decisionmaking models" can provide a useful service. Because they highlight the significance of certain features of the peculiar environment of Soviet R&D decisionmaking, they are likely to be of real use in opening up fruitful lines of inquiry that would otherwise be hidden. If, for example, the preeminent role of a chief designer is nowhere in evidence, then the key question is at least raised as to which mechanisms are employed to perform his functions.

3. Methodological Requirements for this Study

In sum, the methodological problems discussed above suggest that the following general requirements should be met by this study: First, although the focus of the study is on the roles and relationships of middle-level and low-level participants in the Soviet defense R&D decisionmaking process, this aspect of the process is sufficiently

important to the overall process to merit broad coverage. Accordingly, the study should directly relate the roles and relationships of the middle-level and low-level participants to the larger decisionmaking context and shed as many fresh insights on the overall decisionmaking process as is possible.

Second, since broad coverage of the subject matter of the study makes it necessary to rely heavily on data that are not directly derived from independent empirical investigation, the conclusions of the study must be treated with appropriate caution. Indeed, these conclusions should be sufficiently detailed and specific to facilitate their subsequent empirical verification in case studies of particular weapon system developments.

Third, since weapon systems and defense R&D decisionmaking processes can be expected to have certain common elements, especially technical ones, from country to country, the study should utilize, where possible, insights derived from U.S. weapons decisionmaking practices. However, because of inherent bias problems, it should not rely on those insights to substitute for direct evidence on the Soviet side or to serve as primary criteria for selecting and evaluating direct evidence.

Fourth, since weapon systems and defense R&D decisionmaking processes are likely to reflect certain characteristics of the overall national policymaking environment, the study should use, where possible, concepts and information provided by Soviet civilian policymaking activities. Again however, because of inherent bias problems, it should avoid filling gaps in the data on Soviet defense R&D practices with this information or applying those concepts, particularly those asscciated with the interest-group approach, without due regard for the special nature of the Soviet defense setting.

Finally, since defense R&D decisionmaking practices observed in conjunction with some types of Soviet weapon systems may be applicable to other weapon systems as well, it should pay particular heed to the characteristics highlighted by those observations. Nevertheless,

because different characteristics may be suggested by the evidence on other systems, the study should be guided principally by the evidence, using it to test and hopefully expand those observations rather than automatically accepting them as generally valid.

C. STRUCTURING THE STUDY

The purpose of Section I has been to give the reader as complete a background as possible before he acquaints himself with how the Soviet defense R&D decisionmaking process is presently understood to work, and before he takes a critical look, through the author's eyes, at this current understanding with respect to the roles and relationships of the middle-level and low-level participants.

Section II represents an overview of the Soviet defense R&D decisionmaking process. It gives a composite picture that condenses and amalgamates the findings of the best available, recent general studies of the process. The overview serves two purposes. The first and more general purpose is simply to establish the larger decisionmaking context in which the middle-level and low-level Soviet defense R&D participants function. The second purpose is more pointed and critical. It is to acquaint the reader with the perspectives of the roles and relationships of these R&D participants that are contained in current analyses of the overall R&D process. The perspectives provide the basis for the critical appraisals that constitute the core of the study.

The critical appraisals are formatted in Section III as several hypotheses that bear on the roles and relationships of middle-level and low-level decisionmaking participants. The hypotheses point out problem areas in the interpretations of the overall process contained in the composite picture. They are generated by manifest inconsistencies and apparent gaps in the composite picture. The studies from which the composite is drawn do not reflect the implications of important and readily available evidence of the workings of Soviet defense R&D, which in some instances these studies themselves contain. The treatment of concepts and notions drawn from U.S. weapons

decisionmaking and Soviet civilian policymaking practices are inadequate and, in some cases, inappropriate. Also, the studies reflect a hasty generalization of decisionmaking practices observed in particular weapon areas. Note that the term "hypothesis" is used deliberately. The analysis does not assume the level of validity that a direct detailed investigation of a wide range of empirical data would make possible.

A general summary of the principal points contained in each hypothesis is given in Section IV. To enable subsequent verification of the hypotheses empirically, the specific implications of each hypothesis for use in analyzing particular weapon system developments are also presented. In some cases, specific characteristics that should be noted in these developments are pointed out. In other cases, appropriate questions to be posed about these developments are enumerated.

A case study illustrating the application of these hypotheses to the analysis of a particular weapons system is appended.* The case is examined in terms of three key questions about Soviet defense R&D decisionmaking: How are new weapon system programs initiated? How are the elements of a weapons system program coordinated and integrated? Does interest-group activity occur in the development of a weapons system? References that are cited in the report, except for the Appendix, are listed after Section IV.

*Since the information on which the case study is based is classified at a higher level than that of the body of the study, the Appendix is available only in those copies of the study similarly classified.

[redacted]

II. COMPOSITE PICTURE OF THE CURRENT UNDERSTANDING OF THE OVERALL SOVIET DEFENSE R&D DECISIONMAKING PROCESS

This section amalgamates and condenses analyses contained in several recent studies of the Soviet defense R&D decisionmaking process. Unless otherwise indicated, the view given on particular aspects of this process should not be treated as being specifically attributable to any single study. [redacted]

As mentioned in Section I, the composite picture derived from the findings of these studies represents an overview whose purpose is twofold. First, it establishes the larger decisionmaking context in which the middle-level and low-level Soviet defense R&D participants operate. Second, it provides the perspectives on the roles and relationships of the participants contained in current analyses of the overall R&D process.

An overview of the current understanding of how the Soviet defense R&D decisionmaking process works can hardly hope to do justice to all the interpretive nuances embodied in this understanding. Just as such a view must inevitably simplify the complexities of the process, so too it will understandably minimize the areas of disagreement among the various studies from which it is drawn. The composite picture of the overall defense R&D decisionmaking process presented here is, therefore, not intended to convey the impression that all its points are uniformly endorsed. By the same token, areas of particularly vivid disagreement among current analyses of the process are noted wherever possible.

[redacted]

[redacted]

A. ORGANIZATIONS INVOLVED IN THE DECISIONMAKING PROCESS

The basic organizational entities involved in the process by which a new weapon system is developed fall roughly into three categories: "customer," "producer," and "coordinator/monitor/ultimate decisionmaker."

1. Customer

This category comprises the Ministry of Defense and its subordinate elements (Fig. II-1). In one recent study, the basic function of the Ministry of Defense in the R&D decisionmaking process is summed up as follows:

> The Ministry of Defense, the major consumer of the products of advanced military technology, is at the same time a central participant in the process that generates such production. The ministry and its subordinate agencies dominate in the framing of the technological choices of technologies to be pursued and weapons to be deployed... [redacted]

The elements of the Ministry of Defense most directly involved in this basic function are located both at the ministerial/general staff level and at the Service level. The authority at the former level amounts to a ministry-wide responsibility for new weapons policy and coordination. Apparently, over the years, its actual locus has varied between elements at the ministry level and those at the general staff level. The same variation in locus has apparently existed for this top level authority over the Services. For example, between the mid-1950s and early 1960s, the authority for new weapons policy and coordination was located at the ministry level in the Special Directorate of New Weapons under General M. I. Nedelin. However, from 1963 to the end of the 1960s, the responsibility appeared to devolve to the Scientific Technical Committee (NTK) of the General Staff under General A. V. Gerasimov. And this top level function, with respect to R&D within the Ministry of Defense, probably shifted again to the ministry level when Gerasimov's former subordinate, General N. N. Alekseyev, was appointed Deputy Minister of Defense in 1970 [redacted]

[redacted]

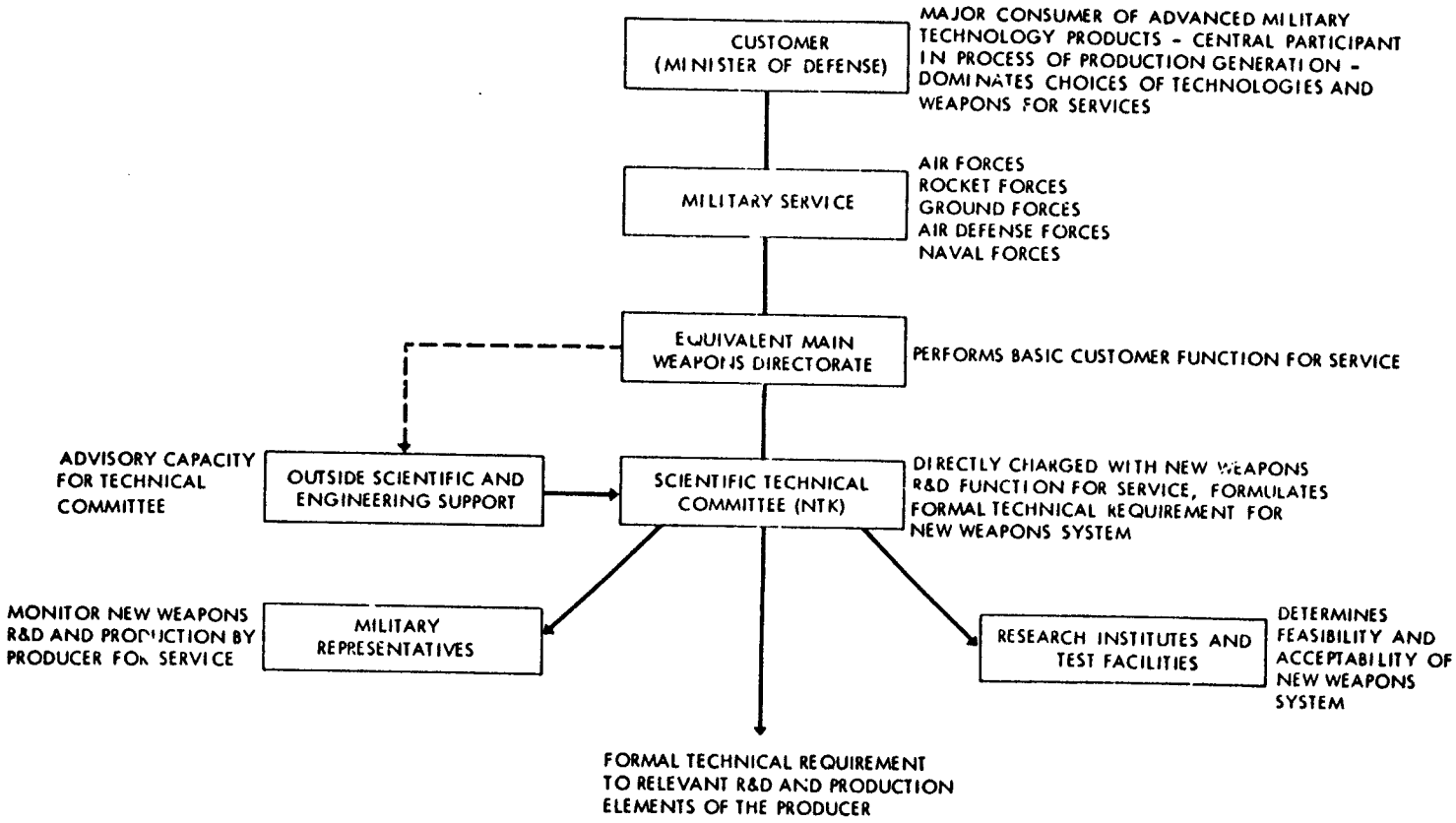

FIGURE II-1. Apparent Rusic Organizational Entities of the Customer - R&D Decisionmaking Process

[redacted]

Each of the five Services has under it the equivalent (or equivalents)* of a Main Weapons Directorate, charged with performing the basic customer function for that Service. This function includes feasibility research relevant to new weapon systems, the formal generation of new weapon requirements, and the monitoring of the development (and production) and testing of new weapon systems. The pertinent directorates for the five Services are: Soviet Air Forces/ Aviation Engineering Services Directorate, Soviet Rocket Forces/Main Directorate for Rocket Armament (GURVO), Soviet Ground Forces/Main Rocket and Artillery Directorate (GRAU), Soviet Air Defense Forces (PVO)/Fourth Main Directorate (4th GUMO), Soviet Naval Forces/ Directorate of Rockets and Artillery and Main Directorate for Shipbuilding and Armaments.

Subordinate to each directorate, and most directly charged with performing the functions of the Service with respect to new weapons R&D, is a Scientific Technical Committee (NTK). It is in this technical committee that the formal technical requirement (TTT or TTZ) for a new weapon system is formulated. The requirement is then "levied" on the relevant R&D and producing elements of the producer. The technical committee also establishes and has direct charge of, teams of military representatives. The teams are sent to monitor new weapons R&D and production carried out by the producer for the Service. A number of research institutes (NIIs) and test facilities, under technical committee jurisdiction, enable each Service to find out whether a new weapon system is feasible and to make sure it will be acceptable once it is developed. However, the extent of the research capability of the Services is by no means clear. It is generally believed that this capability is rather limited [redacted]

[redacted]

*The Soviet Navy, for example, has two such directorates with responsibility for naval R&D programs: the Main Directorate for Shipbuilding and Armaments and the Directorate of Rockets and Artillery [redacted].

[redacted]

[redacted]

The following breakdown of the precise responsibilities invested in the Aviation Engineering Services Directorate of the Soviet Air Forces illustrates the kinds of resources the Services have available to them in discharging their functions with respect to new weapons R&D:

For research generally applicable to requirements definition and generation	-- The Leningrad Military Engineering Academy imeni A. Mozhayskiy, the Military Air Engineering Academy imeni Professor N. Ye. Zhukovskiy
For requirements generation and development/ production monitoring	-- The Aviation Technical Committee (itself)
For testing	-- The Scientific Testing Institute of the Soviet Air Forces, the Scientific Testing Institute for Aviation Instruments, the Scientific Research Testing Institute for Aviation Medicine (Ref. 26, p. 13).

Note that to augment these in-house resources, the weapons directorate of a particular Service may also be able to draw on scientists and engineers from outside organizations (e.g., possibly from other Services, the R&D components of the producers, etc.) to serve in an advisory capacity on the directorate's technical committee [redacted]

[redacted]

2. Producer

If the basic customer role in the Soviet defense R&D decision-making process is essentially filled by the aforementioned elements of the Ministry of Defense, the producer role directly encompasses the activities of eight other ministries and their subordinate elements, and it indirectly involves at least six additional ministries, as well as the Academy of Sciences (Fig. II-2). The eight ministries most directly involved and their general areas of weapon specialization are:

[redacted]

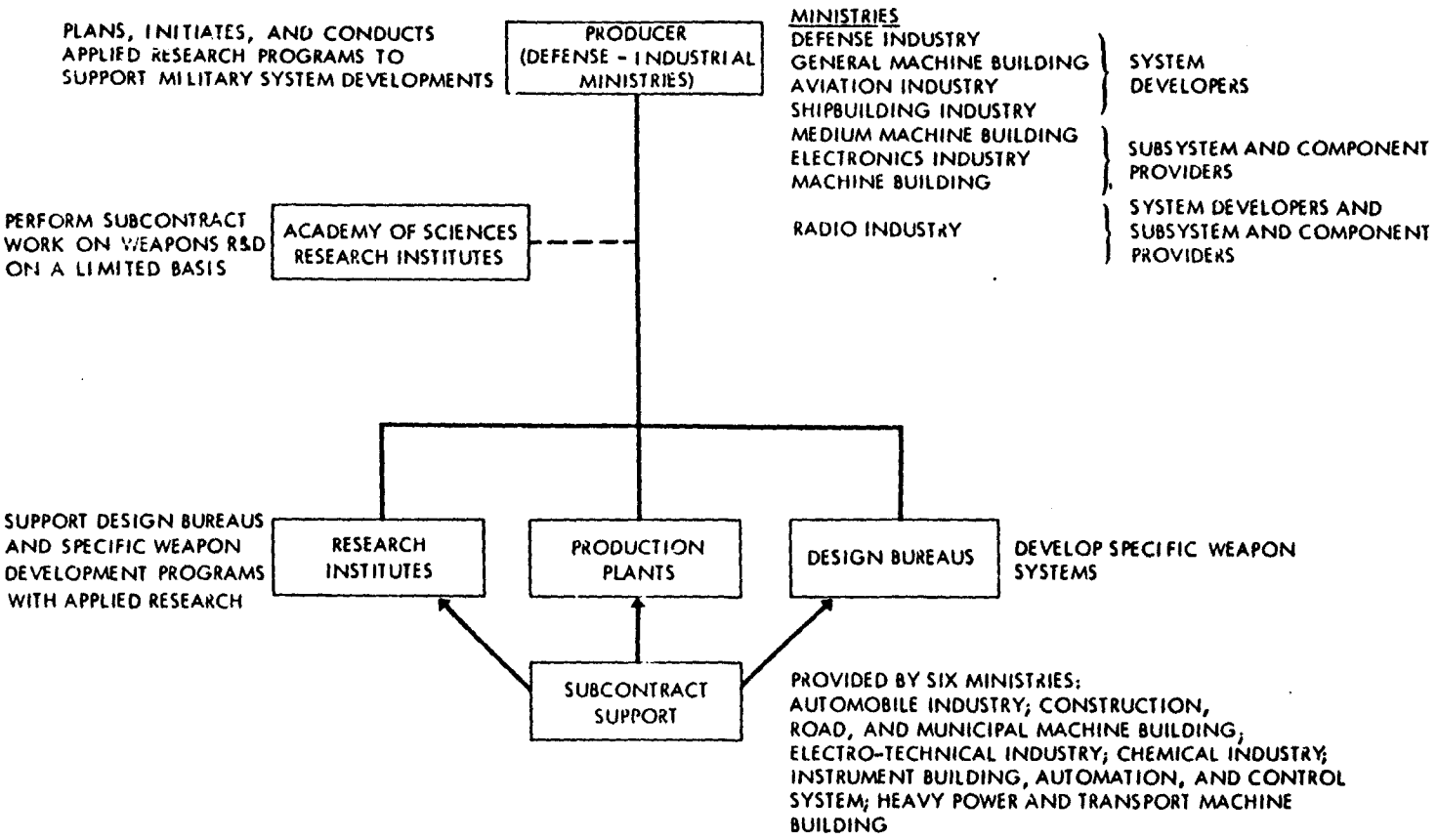

FIGURE 11-2. Apparent Basic Organizational Entities of the Producer - R&D Decisionmaking Process

[redacted]

Defense Industry (MOP)	Armed vehicles, artillery, rockets, small arms, and aircraft armament
General Machine Building (MCM)	Ballistic missiles, space launch systems, upper stages, and nonrecoverable spacecraft
Aviation Industry (MAP)	Aircraft, aerodynamic missiles, defensive missiles, recoverable spacecraft
Medium Machine Building (MSM)	Nuclear weapons and nuclear propulsion plants
Radio Industry (MRP)	Communication/navigational/guidance equipment, computers
Electronics Industry (MEP)	Electronics components
Shipbuilding Industry (MSP)	Naval vessels, underwater weapons, fire control systems
Machine Building (MM)	Ammunition, explosives, fuses and projectiles, and solid propellants

[redacted]

Of these eight ministries, four may be regarded as system developers (MOP, MCM, MAP, and MSP) and three (MSM, MEP, and MM) as basically providers of subsystems and components. The Ministry of the Radio Industry requires a special category. To some extent, as a producer of radars, it qualifies as a system developer as well as a subsystem and component producer.

The six other ministries involved indirectly in defense R&D provide subcontracted support to elements of the eight defense-industrial ministries. These are: the Ministry of the Automobile Industry; the Ministry of Construction, Road, and Municipal Machine Building; the Ministry of Electro-Technical Industry; the Ministry of Electro-Technical Industry; the Ministry of the Chemical Industry; the Ministry of Instrument Building, Automation, and Control Systems; and the Ministry of Heavy Power and Transport Machine Building

[redacted]

[redacted]

[redacted]

The extent and nature of the involvement of the Academy of Sciences in Soviet defense R&D are relatively obscure. While it is generally acknowledged that various research institutes of the academy have participated in defense R&D over the years, some hold that this involvement has been confined mostly to subcontract work on weapons R&D and has been, in the main, quite minimal. [redacted]

[redacted]

Producer elements most intimately involved in the weapons R&D process are the research institutes (NIIs) and design bureaus (KBs, OKBs, SKBs) subordinate to each defense-industrial ministry. The scope of such resources is best illustrated by the fact that the Ministry of the Defense Industry has had at times as many as 25 research institutes, 45 design bureaus, and upwards of 250 production plants in its domain [redacted]

The function of the defense-industrial ministries with respect to weapons research has been summarized as follows:

> The defense-industrial ministries plan, initiate, and conduct the applied research programs needed to support military system developments...Research planning is based largely on a ministry's understanding of future system requirements and established technology. Research programs of the defense-industrial ministries usually are initiated in anticipation of future systems requirements. Only rarely is applied research initiated in response to explicit system requirements [redacted]

The same study cogently describes the relationship between the research institutes and design bureaus, and their basic functions in defense R&D:

[redacted]

[redacted]

> Scientific Research Institutes play an important role in support of design bureaus and specific weapons development programs by conducting necessary applied research activities, preparing design handbooks and specifications, conducting ground environmental testing and prototype testing activities, and evaluating design suitability during the various phases of the weapons development cycle. The actual development of specific weapons systems, however, is the sole responsibility of the chief designer who has been awarded the development program after competition with one or more design bureaus [redacted]

Note, in this connection, that although a defense-industrial ministry may be blessed with a wealth of design bureaus (and research institutes), as illustrated in the case of the Ministry of Defense Industry, relatively few design bureaus tend to predominate in a particular weapons field. When they do, they are usually headed up by elderly designers of long-standing and acknowledged competence, such as Yakovlev, Sukhoy, and Antonov in the aircraft field, and Chelomey, Yangel, and Korolev in the area of ballistic missiles. The role of luminaries is not necessarily confined to design bureaus that serve as prime contractors, responsible for turning out a complete weapon system. For example, in the aircraft field, considerable status is also accorded designers who provide important subsystems for new aircraft, notably engine designers.

Weapons R&D is funded in three different ways: out of the budgets of either research institutes or design bureaus of the defense-industrial ministries (apparently, the most usual way), out of the State budget, or out of the Ministry of Defense budget which sometimes directly funds weapon R&D projects [redacted] The attention given to the applied research activities of the defense-industrial research institutes is exemplified by the recent 10-year period (1959-1968) in which more than 30 percent of the total R&D outlays in the Ministry of the Aviation Industry went to these institutes [redacted]

[redacted]

[redacted]

3. Coordinator/Monitor/Ultimate Decisionmaker

The activities in this third category of organizational entities involved in the Soviet defense R&D decisionmaking process range from monitoring and coordinating ongoing programs to making the final decisions to go ahead with a new system--or, even on occasion, presumably providing the impetus to initiate the development of a new system. Several organizational entities, either formally constituted and identified in the Soviet national policymaking hierarchy, or of a more shadowy or informal nature, are involved in these activities (Fig. II-3). On the formal side, they include the Council of Ministers, the State Planning Commission, the Politburo, and the Defense-Industries Section of the Central Committee Secretariat. Less formal, or less visible, participants are the Defense Council, the Politburo Defense Subgroup, the Military-Industrial Commission (VPK), and the personage of D. F. Ustinov.

As a whole, formal and visible entities seem to play a less prominent role than that of the others [redacted]. The Council of Ministers' role in defense R&D decisionmaking seems to be quite minimal, although in the policymaking hierarchy it is the "formal" superior of one of the key decisionmaking bodies: the Military-Industrial Commision (VPK). Similarly, although the State Planning Commission has the ultimate task of integrating weapon R&D plans into the overall economic plan, its impact on the defense R&D decisionmaking process appears insubscantial. Furthermore, even the Politburo as a whole, in its formal activity of giving the final stamp of approval on new weapon projects seems to be predetermined, to a great extent, by the decisions of its defense subgroup. The Defense-Industries Section of the Central Committee Secretariat, headed by I. D. Serbin, is probably significant in providing a staff support function for two "shadow" organizations, the Politburo Defense Subgroup and the Defense Council. Also, it apparently carries out a monitoring function with respect to ongoing defense R&D programs. However, the extent of the section's

[redacted]

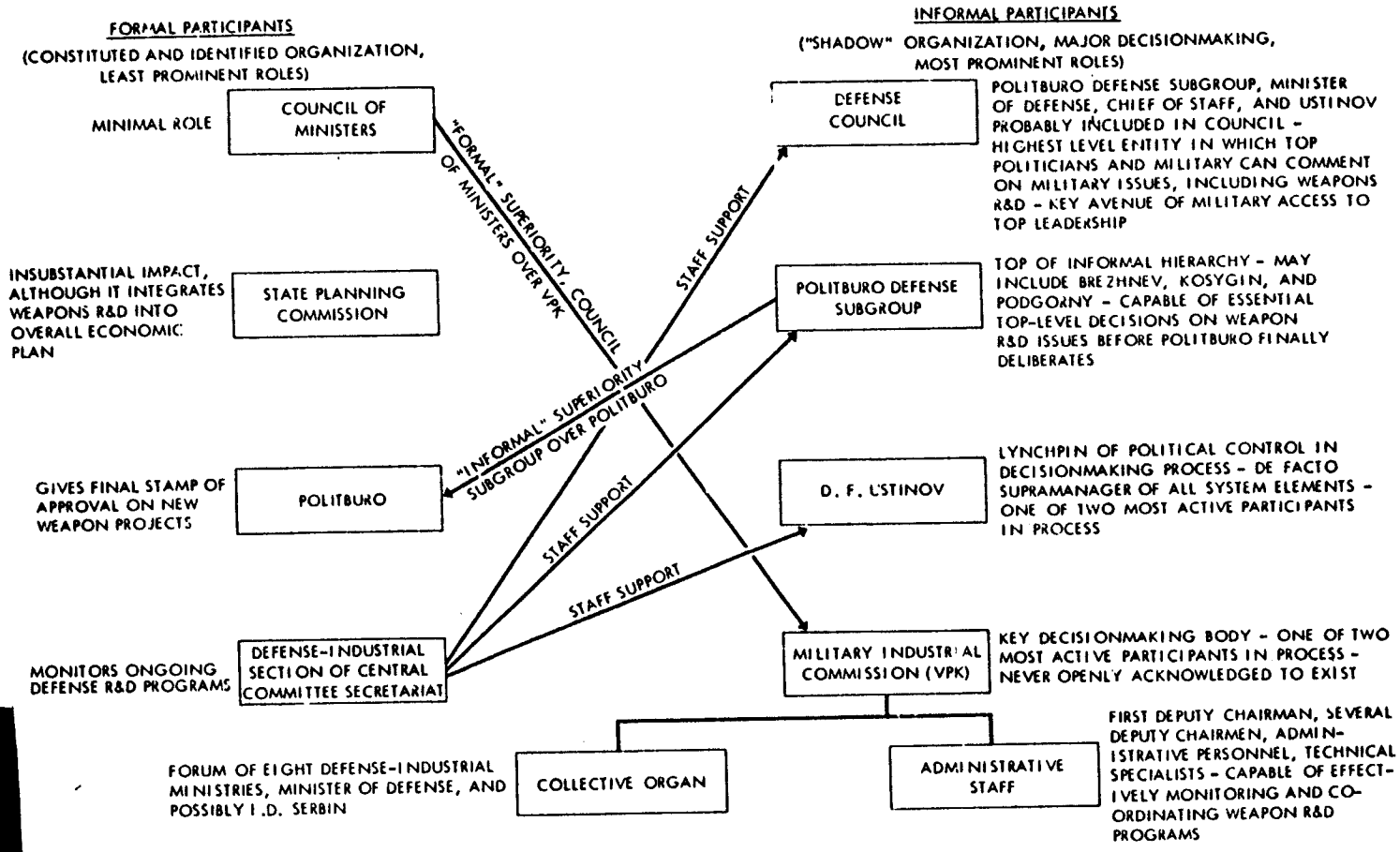

FIGURE II-3. Apparent Basic Organizational Entities of the Coordinator/Monitor/Ultimate Decisionmaker - R&D Decisionmaking Process

capability in providing both these functions is rather murky. For example, there is no firm indication of the approximate size of the section's staff. What does seem clear, is that Ustinov has more power and influence than the section's head, I. D. Serbin; also, the section has evinced no capability in providing top leadership with systems-analysis type evaluations of the cost-effectiveness of new weapons [redacted]

The Politburo Defense Subgroup tops the hierarchy of informal or shadow organizational entities that apparently carry the major clout in defense R&D decisionmaking. Its probable members include Brezhnev, Kosygin, and Podgorny. This subgroup seems capable of hammering out the essential top-level decisions on weapon R&D issues before the Politburo formally deliberates as a whole. The Defense Council is a modern-day version of an organization that has gone through several incarnations since it was originally made prominent by Stalin. It probably comprises the members of the Politburo Defense Subgroup, the Minister of Defense, and various ad hoc members such as the Chief of Staff, and Ustinov, and others. The Defense Council represents the highest-level entity in which the respective views of the top politicians and the military can be aired on a variety of military issues, including weapons R&D. It stands as a key avenue of military access to the top leadership. However, its significance in this respect may be somewhat attenuated by purely personal contacts between military leaders and the top Soviet politicians, and by Marshal Grechko's current status as a full member of the Politiburo.

Probably, the two most active participants in the coordinating/monitoring/ultimate decisionmaker category are the Military-Industrial Commission (VPK) and D. F. Ustinov. The VPK, never openly acknowledged to exist by the Soviets, is a supra-ministerial body whose functions in coordinating and monitoring weapons R&D among the defense industries and between the defense-industrial ministries and the customer (Ministry of Defense) are apparently carried out

[redacted]

[redacted]

on several levels. On one level, the ability of the VPK to perform its function may devolve quite informally, simply on the personal relationship between L. V. Smirnov, its head, and D. F. Ustinov. Smirnov was a protege of Ustinov's and is apparently subordinate to him. More formally, two discrete levels of activity exist in the VPK--a collective organ and an administrative staff.

The collective organ has been identified in a recent study as consisting of the ministers of the eight defense-industrial ministries and the Minister of Defense with I. D. Serbin also included [redacted] However, Serbin's "membership" is somewhat debatable. Because modern weapon systems may require R&D inputs from several different defense-industrial ministries, the need for a forum in which top representatives from all the ministries and the customer ministry can meet seems apparent. However, it is not all that clear as to how effective such meetings are, or how frequently the meetings occur. Two considerations seem to bear on this issue. The first is that the ministers of the defense industries obviously wear two hats--as members of the VPK and as the principal bearers of responsibility for the fortunes of their particular ministries. As a consequence, it is entirely possible that conflicts of interests hamper the effectiveness of the collective organ of the VPK [redacted] The second consideration is that clearly all the ministries are not directly involved in every weapon system. This may mean that only ministers whose ministries are involved in the development of a particular weapon system attend the meetings in which that system is considered. It may also mean that such meetings occur in addition to the formal meetings of all the defense-industrial ministers. In either case, much of the function of the VPK collective organ might be performed by restricted meetings, in which the conflict-of-interest problem is largely subdued.

[redacted]

[redacted]

[redacted]

The VPK also possesses a staff whose activities possibly help to override whatever stopgaps occur in the workings of the commission's collective organ. This staff has been characterized as follows:

> The administrative staff is directly subordinate to the...Chairman (L. V. Smirnov) and consists of a first deputy chairman, several deputy chairmen, administrative personnel, and technical specialists. The staff is structured functionally with each deputy chaiman apparently responsible for a major defense industrial area [redacted]

The staff, accordingly, seems to possess a capability to effectively monitor and coordinate weapons R&D programs.

D. F. Ustinov is usually regarded as the lynchpin of political control over the defense R&D decisionmaking process in the USSR. He has this role because of his standing as a candidate member of the Politburo (a status that L. V. Smirnov, I. D. Serbin or any of the defense-industrial ministers do not possess), his long involvement and expertise in the weapons field (in contrast to the other top political leaders), and his having "tutored" many of the defense-industrial managers now subordinate to him in key positions. The role and function accruing to him have been described thus:

> The role of the Party keyman, D. F. Ustinov, as a "crisis manager," interjecting himself into the administration and coordination of this system at all levels, on a broad range of programs, and in the greatest detail imaginable, makes him the de facto supra-manager of all system elements [redacted]

B. STEPS IN THE DECISIONMAKING PROCESS

To briefly illustrate the current understanding of the roles and relationships of the various entities in the overall decisionmaking process, it is useful to summarize what is thought to be the sequential steps by which the need for a new weapon system might typically be transformed into an item ready for serial production.

[redacted]

[redacted]

For the sake of convenience, these steps are broken down into two basic categories. The first includes the part of the decision-making process that ranges from identifying the need for a new weapon system to the Politburo decision (communicated to the VPK and the defense-industrial ministries and their components) to proceed with system development. The second category encompasses the steps in the actual development of a new weapon system up to the decision to proceed with serial production. Typically, steps in the first category heavily involve the Ministry of Defense and its subordinate elements. Also, other entities participate, either formally or informally. These are the VPK, Ustinov, relevant defense-industrial ministries, and members of the top political leadership particularly concerned with defense matters.

1. First Stage

1. New weapon system need is identified.
2. Technical method for meeting need is explored.
3. Technical feasibility is determined.
4. Military service sounds out MOD (Ministry of Defense), General Staff.
5. Top level military authorities consult Ustinov and Brezhnev.
6. Weapons Requirement Draft (TTT) is prepared.
7. Military service command reviews.
8. General Staff and MOD review.
9. Smirnov and Ustinov review.
10. Appropriate defense industry ministries review.
11. VPK (Military-Industrial Commission) reviews.
12. Ustinov consults Gosplan (State Planning Commission) on resources.
13. Defense Council reviews [redacted]

The entity that takes the first step is probably the most difficult to pin down since, theoretically at least, the perception of the need for a new weapon system can emanate from any one of several sources. For example, it may be generated by officers in

[redacted]

[redacted]

the field (and then transmitted to the Service leadership); it may stem instead from the Service leadership itself or from the ministry or General Staff levels in the top hierarchy of the Ministry of Defense. Alternately, this perception might come directly from one of the top political leaders. At quite a different level, it may arise from the technological possibilities comprehended by a designer in the defense-industrial sector. Presumably, all these possible sources, or even other sources, are reflected in the variety of weapon systems deployed by the Soviets over the years. However, assigning precise responsibility for the inspiration of any one system is an open question. [redacted]

As discussed earlier, steps 2, 3, and 6 are the basic responsibility of the appropriate Service weapons directorate, particularly its technical committee which can draw on the resources of the Service research institutes. Steps 4 and 5 are essentially informal steps. They are designed to determine the sort of reception the idea for a new system can expect to meet at the higher levels of the Ministry of Defense and the opposition, or the kind of support top politicians might give the idea once a requirement for it is formally generated by the Service. Basically, the remaining steps in this first category aim at securing formal acceptance of the new system requirement by appropriate elements of the military, political, and defense-industrial decisionmaking hierarchies.

2. Second Stage

The second category of steps commences with the endorsement given the proposed new system by the Politburo Defense Subgroup after successful review of the system by the Defense Council. This endorsement occurs after step 13 in the first category, in which Brezhnev would probably endorse the new system in the Defense Council review meeting with top military leadership. Council acceptability, under present circumstances, would basically determine the position taken

[redacted]

[redacted]

by the Politburo Defense Subgroup in presenting the proposed system for formal consideration by the Politburo. However, the subgroup would presumably enlist some staff aid from Serbin's section and possibly seek some advice from specially convened ad hoc groups of weapon experts before it solidifies its position. As with the subgroup, the acceptability by the Defense Council would probably favor acceptance by the Politburo, followed by its formal approval.

Once Politburo approval is given, the locus of decisionmaking activity shifts to the Military-Industrial Commission (VPK). Again, after appropriate staff work (by the VPK),

> ...a prime system developer ministry/executor is assigned overall responsibility, based on product line charter, for fulfilling the (Ministry of Defense) requirements. During this procedure, the VPK staff is probably in working contact with Gosplan (State Planning Commission) officials. When major support is required from other defense-industrial ministries, a negotiated protocol is signed at the ministry level. This protocol spells out interministerial tasking with expected completion schedules... Once signed, the protocol represents a Party, Council of Ministers, and VPK decision and is binding on all participating ministries and facilities [redacted]

The next basic step is for the "primary" defense-industrial "contractor" to establish an Expert Commission, which exists for the duration of the entire development cycle. The commission consists of representatives of the customer, research institutes, design bureaus of the "primary contractor," and appropriate shops of other ministries expected to provide subsystems and components for the new system. Under the aegis of the Expert Commission,

> ...a request for a preliminary design called a preproject study is formulated and, in the aviation industry, is levied on several design bureaus for competition [redacted]

The designer or competing designers prepare the preproject study, utilizing design handbooks written by the relevant research

[redacted]

[redacted]

institutes for the system in question. Performance criteria in the handbooks constrain the designers. But, presumably, the handbooks contain information on the "latest" advances in the state of the art, which benefits the designers. Military representatives of the appropriate Service, from the Ministry of Defense side, are called upon to monitor the preparation of the preproject study and, in the case of the "winning" designer, the subsequent development of the new system.

When the preproject study or studies are completed, the Expert Commission makes a decision to proceed with a mock-up of the new system by the winning designer. After the mock-up by the winning designer is completed, a Mock-up Commission is established to evaluate it for the customer:

> For military aircraft, the chairmen of these commissions are probably representatives of the Scientific Testing Institute of the Soviet Air Forces...This commission thoroughly evaluates the mock-up and prepares a detailed report. The report is forwarded through the Air Force to the responsible ministry's Expert Commission. Based on this report, the Expert Commission designates one design for continued effort through the detailed design and experimental model phase [redacted]

The detailed design supposedly accounts for changes recommended by the Mock-Up Commission, and when it is finished the Expert Commission convenes for another review. Based on this review, the commission gives the go-ahead for prototype construction. This construction is usually performed by a preproduction plant attached to the design shop.

> In the Aviation Industry, a number of prototypes, anywhere from 2 to 10, are constituted for flight test [redacted]

After tests at the appropriate defense-industrial ministry's facilities, a state commission is convened to supervise customer testing. The state commission comprises members from the relevant Service and the primary producer ministry.

[redacted]

[redacted]

At the end of testing, a document containing detailed technical specifications on the new system is prepared. The document serves, subsequently, as a primary quality-control device for serial production of the system. When it is signed, the R&D process affecting the new weapon is essentially complete. The stage is then set for the high-level decisions that determine the production and ultimate deployment of the system. It is emphasized that throughout the actual development of the new system, it is closely monitored not only by military representatives, but also by Ustinov, the Military-Industrial Commission, and the Defense-Industries Section of the Central Committee Secretariat.

C. SALIENT CHARACTERISTICS OF THE SOVIET APPROACH TO DEFENSE R&D DECISIONMAKING

In rounding out the composite picture of the overall Soviet defense R&D decisionmaking process, features emphasized by current analyses of the process bear highlighting.

1. Supervision by Top Political Leadership

Effective supervision of new weapon systems development is apparently exercised by the top political leadership. This is particularly well exemplified in the supervisory capacity of D. F. Ustinov. In this regard, a quotation cited earlier bears repeating:

> The role of the Party keyman, D. F. Ustinov, as a "crisis manager" interjecting himself into the administration and coordination of this system at all levels, on a broad range of programs, and in the greatest detail imaginable, makes him the de facto supra-manager of all system elements [redacted]

His effectiveness in this role is characterized, by the same study, as follows:

> It appears that the military R&D system, if it is to operate with any effectiveness, requires the direct involvement and intervention of the highest level of the Party;

[redacted]

[redacted]

> Ustinov's function in the system is likely to continue to be required [redacted]

To be sure, Ustinov is hardly regarded as being a solitary agent in exercising this supervisory function. Two other individuals also seem to have particularly important roles to play: L. V. Smirnov (Chairman of the Military Commission) and I. D. Serbin (head of the Defense-Industries Section of the Central Committee Secretariat). But evidently, they too are generally considered to be basically subordinate and responsive to Ustinov. Smirnov's subordination is implicit in the characterization of the Military-Industrial Commission as:

> ...presided over by L. V. Smirnov but responsible to Central Committee Secretary D. F. Ustinov [redacted]

Similarly, Serbin's subordination to Ustinov is implied in the view that

> ...the Defense Industries Department...is headed by I. D. Serbin but...also serves Ustinov as a support staff on defense-industrial matters [redacted]

Ustinov's effectiveness and control are not merely the products of the particular subordinations described above, nor of the weapons expertise he is implicitly credited with by dint of training and long experience in dealing with defense-industrial matters. They are also a consequence of what is described as cronyism. He is able to influence top managers of the defense industry, because many of them either began their careers and developed under his tutelage when he ran the defense industry, or they shared early industrial work experience and perspective with him. For example, S. A. Afanasyev (Minister of General Machinebuilding), V. V. Bakhirev (Minister of Machinebuilding), V. N. Novikov (Foreign Economic Commission),

[redacted]

[redacted]

[redacted]

K. N. Rudnev (Minister of Instrument Building, Automation and Control Systems), I. D. Serbin, L. V. Smirnov, G. A. Tyulin (Deputy Minister of General Machinebuilding), G. R. Udarov (Deputy Minister of General Machinebuilding), and S. A. Zverev (Minister of the Defense Industry), among key defense industry managers, were at one time proteges of Ustinov or worked under him. These kinds of long-time contacts ensure that Ustinov knows the personal quirks, strengths, and weaknesses of the defense-industry managers. Consequently, much of his interaction among top managers is based on cronyism [redacted]

2. Apparent Lack of Systems Analysis Type of Evaluation

The sort of effective control exercized by the top political leadership, via Ustinov, over the development of a new weapon system should not obscure another important feature of the Soviet defense R&D decisionmaking process. As noted earlier, the top leadership's overall capability to determine the need for a new system and to monitor its subsequent development apparently does not include a systems-analysis type of evaluation capacity. As one study has concluded:

> The apparent lack of an independent analytical capability at the top level for systematic and substantive correlation of military requirement with technological possibilities and economic costs is a putative weakness of the system that could leave the top political leadership vulnerable to decisionmaking inputs furnished by a powerful military-industrial bureaucracy below [redacted]

The same study also concludes, however, that

> ...the inability of the highest echelons of the Soviet policy pyramid to do in-house optimal planning has not inhibited and may indeed have abetted the determined expansion of Soviet military power over the last half-dozen years. Thus, though the bias of the system may have tilted decisions in a pro-defense direction, the results seem such that the Soviet leaders, with perhaps a few exceptions, can hardly view them as unsatisfactory. Indeed, through the leadership's eyes,

[redacted]

[redacted]

> the system's record may seem sufficiently impressive to block major changes within it [redacted]

3. Conservative Design Philosophy

Another important feature of the Soviet defense R&D decision-making process worth noting is the one that is revealed in the very design characteristics of Soviet weapon systems. For example, in Soviet aircraft in particular, a basically conservative design philosophy is said to predominate [redacted] Several elements apparently converge to produce this conservative bias. To meet requirements of easy operation and repair for the aircraft and to develop these aircraft quickly, there are incentives to keep designs simple and to

> ...use subsystems and components already in existence

which means, in effect, to

> ...use as much off-the-shelf hardware as possible

[redacted]

The basic perceptions of the designers themselves seem to be at the center of this conservative bias.

> Because the designers may pay a higher penalty for technological gambles that are not successful, and because the military has occasionally bemoaned the conservatism of Soviet design traditions, the military probably are more prone to seek substantial technological advances in new weaponry [redacted]

Note that the weapon systems area where this conservatism seems most vivid is also the area where the role of designer luminaries appears most pronounced. Insofar as such luminaries in the aircraft field resist bold innovations, the very conservatism of their designs seems to testify to their power to fend off radical departures proposed by the relevant Services.

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Presumably, one of the penalties designers may wish to avoid by sticking with simple, conservative designs is the loss of future contracts that might come with the failure of an avant-garde system. Again, this may be given particular weight in the area of aircraft development, since it is here also that design competition seems to be heavily featured. It has been noted that the competition that seems so endemic in aircraft development may not be as pronounced in the case of other weapon systems. For example,

> While the sequential phases of aircraft development may in part apply to Soviet ballistic missile development programs, there is some evidence that the latter have not settled into the routines and procedures followed in aircraft development. It appears, for example, that the Soviets tried and then discarded the competitive prototype approach to ballistic missile development that they have fon found suitable in the case of aircraft [redacted]

Besides the conservative biases on the part of eminent designers, note also that the latter are not the only participants in the defense R&D decisionmaking process who may be set in their ways. Indeed, an often noted characteristic of the major actors in the defense-industrial sector is the advanced age and long job tenure of the top managers--not only in the case of such supermanagers as L. V. Smirnov and D. F. Ustinov, but with respect to the defense-industrial ministers as a whole. More likely than not, the age factor in this segment of the defense R&D decisionmaking network complements and reinforces the conservatism observed on the part of top designers.

4. Pushing the State of the Art Technologically

By way of giving a somewhat more balanced picture of the impact of design conservatism on the Soviets' overall approach to defense R&D, note that some studies emphasize a Soviet concern with pushing the state of the art technologically:

> Major decisions on basic military R&D strategy and funding in the Soviet Union appears to be directed toward advancing the general state of

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[redacted]

> the art in certain military technology areas rather than being undertaken in support of specific weapon system developments. This somewhat open-ended approach to much of military R&D has a tendency to generate open-ended growth in expenditures [redacted]

Given the stated "separation" of urges to push the state of the art from the development of specific weapon programs, the presumed locus of the prineipal beneficiaries of these urges is the research institutes of the defense-industrial ministries. Presumably, these institutes would themselves be a driving force behind the impetus in state-of-the-art advances as well as the beneficiaries of a general R&D policy with this bias. Probably, therefore, it is the defense-industrial research institutes in particular that are being referred to in the following statement:

> In some instances, the stimulus to explore new paths in weapons technology may derive in part from knowledge of the adversary's technological potential and activities, but the principal incentives are seen to be internally seated in a desire to push the state of the art as far as it will go (Ref. 22, p. 265).

5. "Constant Shares" Principle

Another significant phenomenon that apparently characterizes the Soviet defense R&D environment is the "constant shares" principle. Its existence and impact have been described as follows:

> There is some indication that once established, an institutional claim on a given share of resources tends to perpetuate itself, acquiring a kind of sanction that makes it bureaucratically difficult to shift resources rapidly in new directions, and especially to cut back the accustomed level of allocation. This tendency may apply both to the military claim as a whole on resources, and to the internal pattern of allocation within the military establishment itself. Although there have been gradual shifts over time in distribution of resources among various elements of the military, the apparent persistence of relatively stable shares of resources, especially with regard to procurement expenditures,

[redacted]

[redacted]

> suggests that the Soviet planning system and bureaucratic structure together may have a built-in inertia resistant to the reordering of priorities from above--barring major changes in the internal or external environment [redacted]

While this description is given in terms of its application to the Ministry of Defense and its components, it can be taken to apply as well to the defense-industrial ministries. For example, such a general claim is implicit in the following statement:

> When the interests of various powerful bureaucracies collide, some fairly simple solution to bureaucratic revalaries may be imposed to keep organizational peace within the system [redacted]

Note that in the presumed broad applicability of the constant shares principle to the defense-industrial ministries, the elements of such a principle are implicit in assertions of the continuity and longevity of top personnel, witnessed in the defense-industrial sector. The notion that there is minimal "rocking of the boat" exists in this sector. Such a notion, which is in the interests of preserving established managerial fiefdoms and avoiding internecine feuds, is clearly implicit in statements that the defense-industrial ministers have sought--and, as powerful men with long tenures, have essentially secured--a basic self-sufficiency for their ministries.

> To minimize their dependence upon other sectors of industry and to minimize their career risks, ministers characteristically have sought self-sufficiency in all endeavors essential to meeting their tasks [redacted]

6. Potential for Interest Group Activity

A final feature of the Soviet defense R&D decisionmaking environment worth highlighting is the inherent potential for interest group activity. As one study pointedly asserts,

> It is probable that special interest ties have developed between the various military services

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and those organizations in the defense-industry sector which develop and produce weapons. An alliance probably exists, for example, between the various working elements of the Ministry of General Machine-building, which probably is responsible for the design and production of strategic ballistic missiles, and the military representatives of the Strategic Rocket Forces [redacted]

The study then proceeds to indicate other likely alliance relationships between Services and defense-industrial ministries, based on their shared participation in particular types of weapon systems. These alliances include:

- Ground Forces and the Ministry of the Defense Industry in the weapon areas of infantry material, armor, tanks, and rockets and artillery
- Ground Forces and the Ministry of General Machinebuilding, also in the area of rockets and artillery
- Navy and the Ministry of Shipbuilding in the weapon areas of surface ships and submarines
- Navy and the Ministries of the Aviation Industry and Radio Industries in the areas of long-range air, ASMs
- National Air Defense (PVO) and the Ministries of the Aviation Production and Radio Industries in the weapon areas of fighters, AAMs, and SAMs
- National Air Defense and the Radio Industry in the area of ABMs
- Air Force and the Ministries of the Aviation Industry and Radio Industries in the weapon areas of fighters, AAMs, bombers, and ASMs
- Air Force and the Ministry of the Aviation Industry in the area of transports
- Strategic Rocket Forces and the Ministries of General Machinebuilding and the Radio Industry in the weapon areas of ICBMs and M/IRBMs-[redacted]

The obvious common interest of two such powerful and well-entrenched sets of bureaucracies as the Services and the defense-industrial ministries is to promote particular kinds of weapons systems. This could result in strong internal pressures being

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exerted on top level decisionmakers for the development and deployment of new weapon systems. And such systems may not necessarily be warranted by a "rational" appraisal of the international environment. However, this does not mean that incessant internecine feuding occurs between particular combinations of Service/defense/industry "allies." For example, the constant shares principle is presumed to act as an important damper on such rivalry [redacted] Indeed, the invocation of the constant shares principle against a backdrop of virulent pressure to develop new weapon systems by such a range of powerful alliances would seem to have the inevitable effect of producing steady, across-the-board increases in the Soviet arsenal. Also, to some extent, the rivalry between these alliances is probably held in check by the mediatory activities of the General Staff and Ministry-level elements of the Ministry of Defense in the competition among the Services. Presumably, D. F. Ustinov also mediates, especially in defense-industry competition in these Service/defense-industrial ministry alliances [redacted]

Finally, it is important to note that there appear to be fairly broad parameters within which interest group activity in defense R&D can operate. On the one hand, no matter the particular weapon interests that may separate one set of Service and defense-industry ministry allies from another, they can all be expected to unite in the general cause of promoting military spending versus civilian spending. On the other hand, alliances on behalf of a particular weapon system may cut across Service lines. For example, the long-range Air Force may have a greater common interest with naval aviation than with Air Force tactical aviation. The latter, in turn, may find its greatest common interest with the National Air Defense forces and elements of the Ground Forces [redacted]

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III. HYPOTHESES CONCERNING POSSIBLE NEEDED REFINEMENTS IN THE COMPOSITE PICTURE OF THE SOVIET DEFENSE R&D DECISIONMAKING PROCESS

A detailed, direct examination of all the significant elements of the Soviet defense R&D decisionmaking process is not feasible within the confines of this study. Consequently, the findings of several recent analyses have been amalgamated to provide a view of the larger decisionmaking context to which the principal considerations of the study relate. In developing this view, certain problem areas have been identified, particularly those that bear on the roles and relationships of middle-level and low-level participants (designers, research scientists, Service representatives, defense-industrial ministers, defense sector watchdogs, et al). These problem areas are expressed in the form of hypotheses. Hopefully, they provide the means of more fully understanding the overall process of Soviet R&D decisionmaking.

Note that these hypotheses should be regarded as only hypotheses. Given the confines of the study, they are not the products of a full-blown investigation of a wide range of direct empirical data on the workings of Soviet defense R&D. They are rather broad inferences. These inferences are based on what seem to be inconsistencies and anomalies in the composite picture of the Soviet defense R&D decisionmaking process. They are also based on gaps in this picture that might be filled by taking into appropriate account certain insights drawn from U.S. weapon decisionmaking and Soviet civilian policymaking practices, and the implications of available evidence of the workings of Soviet defense R&D.

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A. HYPOTHESIS NO. 1 - OVERSTATED SUPERVISION BY TOP POLITICAL LEADERS

The extent of direct competent supervision exercised by the top political leadership over the development of new weapon systems is probably overstated in most recent studies of Soviet R&D.

The technical expertise and combined work capacity of the individuals designated as the principal political watchdogs of defense R&D are the chief considerations underlying this hypothesis. The composite picture gives the clear impression that on both points the Soviet political leadership has ample resources at its disposal to keep effective tabs on the simultaneous development of a broad array of new weapon systems. Indeed, it might be said that this impression contrasts starkly with the leadership's inadequacy on another score: it apparently lacks the means to perform systematic cost-benefit analyses in deciding which new weapon systems are worthy of development, production, and deployment. While there is no reason to assume that a "weakness" in one area of weapons R&D decisionmaking automatically leads to a "weakness" in another, there still appears to be ample grounds on which to question whether the top leadership is, in fact, as fully in command as it is made to seem.

1. Management Demands of Modern Weapon Systems

The impression of effective and pervasive political supervision of on-going weapon system development programs is fostered in a number of ways. In the most general sense, it is fostered by such statements as:

> Over half the Politburo members have technical backgrounds and are equipped by experience to handle problems affecting the national R&D effort [redacted]

More pointedly, this impression is fostered by statements cited earlier that emphasize the extent and depth of D. F. Ustinov's personal involvement in a myriad of decisions affecting the on-going development of new weapon systems. Whatever the background and incentives of either Ustinov or even the abovementioned Politburo

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members to actually perform the kinds of tasks they are assumed to do, one can cast doubt on their respective abilities to keep close tabs on weapon system developments. In the case of Ustinov in particular, the effect of the customary characterizations of his role is to endow him with almost superhuman competence and endurance.

Of course, this kind of characterization is fully in keeping with certain traits of Soviet policymaking in an earlier period. Stalin, for example, presumably involved himself on occasion even in relatively minor decisions on the development of various weapon systems. Whether the "Great Genius of Mankind" possessed sufficient technical expertise to make effective decisions on those occasions is not possible to say. What is possible to say is that the nature and complexity of the technologies employed in modern weapon systems would seem to make it quite difficult for Ustinov to be personally as effective as he is assumed to be, in making similar decisions on a broad range of development questions affecting such systems.

The kinds of demands for expertise and the workload burden imposed on those charged with supervising the development of modern weapon systems are particularly well presented in a recent analysis of the Polaris program in the United States.

> But the FBM (fleet ballistic missile) was too important, too big for the Program's Director, Admiral Raborn, to rely simply on the good judgment of his Technical Director. Although giving assurance to others that the Polaris would be developed successfully and on time, he needed assurance of his own that this would be so. Thus, Admiral Raborn had to have independent sources of information through which he could check on Admiral Smith and the progress of the FBM program. The Chief Scientist and Engineering Consultant, men whose functions were never clearly defined or even distinguishable, but whose experience was broad and whose knowledge of the technologies was extensive, reported to Admiral Raborn on program developments and opportunities. The weekly management meeting, which Admiral Raborn

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> never missed, provided another check on the Technical Director as it offered an intensive review of the program through the reports of the Program Evaluation Branch, the technical branches, the field offices, and the contractors. In addition, Admiral Raborn was the beneficiary of the conflict between the Director of the Plans and Programs Division and the Director of the Technical Division over budgets since it kept him informed of the alternatives for resource allocations. He also knew personally the presidents of all major contractors and travelled constantly to their plants asking questions and making inspections. Finally, with the assistance of the Naval Ordnance Laboratory, he established a special advisory committee of technical naval personnel to review independently the program's technical decisions and test results (Ref. 27, p. 155).

This quoted description is not intended to suggest that effective supervision of Soviet weapon systems need emulate U.S. practices, nor that Ustinov need be the essential counterpart of Admiral Raborn in the development of each new Soviet weapon system or of any particular system. Admittedly, the Polaris weapon system is highly complex. But the magnitude of the management problems involved in its development does impose some kind of realistic perspective on Ustinov's position as the designated "supramanager" of a broad array of modern Soviet weapon systems, some of which may be as technically complex as Polaris.

What may prove particularly misleading in assessing Ustinov's position as a supramanager is that, quite apart from the historical precedent of Stalin's personal involvement in weapon decisionmaking details, past circumstances in the Soviet defense R&D decisionmaking environment as a whole, or circumstances related to certain kinds of weapon systems, such as aircraft, tempt generalization to the present and future. For example, in certain weapon system areas (e.g., aircraft), the overall management problems may have been and perhaps still are considerably more simple than those exemplified by the Polaris system. If, as is asserted in the composite picture of the Soviet defense R&D decisionmaking process, chief designers,

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particularly prestigious ones, are entrusted with much of the management authority in developing a new aircraft, the burden on a supra manager like Ustinov would be presumably eased a great deal. Similarly, the need for his intervention would appear to be mitigated by the previously stated reliance on off-the-shelf hardware for new systems and by the essential "self-sufficiency" of the defense-industrial ministry primary developer. Presumably, these factors would obviate many of the coordination problems associated with an extensive reliance on other defense-industrial industries.

It is not entirely clear as to what extent the reliance on competent and trusted designers, the ability to utlize off-the-shelf subsystem and component elements, and the sufficiency of in-house resources in a given defense-industrial ministry characterize the broad spectrum of present or recent Soviet weapon system developments. On technical grounds alone, it appears quite plausible to expect that the significance of such factors in facilitating Ustinov's supervisory activities would vary greatly according to the kinds of weapon systems involved. In this regard, reliance on the "aircraft decisionmaking model" may tend to obscure certain situations. These are situations in which the role and competence of weapon designers are less pronounced than those of the aircraft designer luminaries, the ability to use off-the-shelf hardware items is not at the level past aircraft designs may have indicated, and the self-sufficiency of the "primary producer" ministry is inferior to that attributed to the Ministry of the Aviation Industry.

2. Nature and Limits of "Informal" Decisionmaking Procedures

A related "variable," which may be of prime importance in estimating the comparative effectiveness of a supramanager like Ustinov, is the personal relationship factor. It seems reasonable to grant that informal ties between various significant participants in the Soviet defense R&D decisionmaking process have counted for much in making the process work--either by facilitating the formal relationships described in the process or circumventing them when they did

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not work. In Ustinov's case particularly, it has been noted that one important byproduct of his career has been the accumulation of personal ties with a host of key defense sector personnel. Depending on how beholden these people have been to Ustinov and could be relied upon to perform effectively and with demonstrable responsiveness to him, his supervisory burdens have been doubtlessly eased.

While the general importance of the informal element in Soviet decisionmaking in the defense sector has been well and broadly recognized, the variable nature of this element does not appear to have been given sufficient emphasis. Just as the U.S. practices described in the Polaris case help to focus on the magnitude of management problems which the very technical complexity of modern weapon systems seems likely to impose on either Soviet or U.S. decisionmaking in general, so too does U.S. experience help in examining particularly the informal element in Soviet decisionmaking. The basic distinction drawn by Graham Allison in his discussion of decisionmaking models, between the organizational process model and the bureaucratic politics model, is particularly germane (Ref. 4, pp. 57-73). In essence, the organizational model bases its conclusions about decisionmaking influence and likely policy outputs on an assumption that the formal organizational entities of the decisionmaking process pretty much tell the whole story. Once the proper organizational entities involved in a given policy issue are identified, their standard operating procedures are accounted for, and their links to other entities are described, the model users have a reasonable right to expect the prediction of a particular policy outcome.

By contrast, the bureaucratic politics model is regarded (and rightly so) by Allison as being much less capable of entertaining predictive outcomes. While acknowledging the basic significance of most formal elements of the decisionmaking process, this model particularly emphasizes the personality factor as a key variable. It recognizes that the impact of a given organization on relevant policy

issues is likely to vary over time and from issue to issue, even if it is involved with the same organizations in these issues. Although the organizations may remain the same, different personnel will occupy different key positions in these organizations, have different personal contacts than their predecessors, and employ different political bargaining skills on different issues. These distinctions make organizational relationships inherently dynamic and the policy outcomes of these relationships much more difficult to predict than the organizational process model will allow.

In the present case, the particular significance of these distinctions suggests the necessity of avoiding the tacit assumption that the benefit of informal ties to Ustinov is either ubiquitous throughout the defense sector or invariant in any particular area of this sector. To be sure, the organizational stability of the entities in the defense sector--and in the USSR as a whole--plus the long tenure of many key defense sector personnel should be given their proper due in contributing to Ustinov's informal effectiveness over time. Nevertheless, it would seem unlikely that the influence of the personal relationship factor would be uniform between weapon system developments. While it may seem obvious when explicitly stated, one would certainly expect the significance of informal ties to vary considerably in facilitating Ustinov's function as a supra-manager of Soviet weapon system developments. This variance would depend on the particular ministerial leaders, designers et al., involved in the developments.

3. Relationships and Support Capabilities of the Defense Sector Watchdogs

Finally, in assessing the ability of the top political leadership to competently and directly supervise on-going weapon development programs, it is crucial to consider the assistance that Ustinov is likely rendered by key management figures, such as Smirnov and Serbin, and by staff support elements. Clearly, to appreciate that modern weapon systems impose considerable management demands because

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of their technical complexity does not mean that Ustinov can only perform effectively if he personally possesses detailed technical knowledge in a broad array of weapon areas. Indeed, it is because he cannot possibly possess such knowledge, notwithstanding his long experience and undoubted diligence, that such assistance assumes particular importance. However, on this score, it is also doubtful whether the composite picture leaves a fully accurate impression. One problem here is that there is room to question whether the key management figures of Smirnov and Serbin are amenable to the supine subordinate roles they are assumed to play relative to Ustinov. In fact, they may clearly acknowledge Ustinov's superiority and basically seek to assist rather than obstruct his efforts. Nevertheless, as discussed in some detail below, in the light of Soviet political experience the formal positions of both these men do not rule out, by any means, their capacity to take, or at least aspire to take, independent action.

Logically, the extent to which Smirnov and Serbin are personally capable of independent action would seem to affect the extent of assistance their staffs may give Ustinov. Note, in this connection, that the staff elements of the Military-Industrial Commission which Smirnov chairs do not appear to be as likely to gear their efforts to personally support Ustinov as do the staff elements subordinate to Serbin. This is due simply to the different nature of the two organizations. The representation of the presumably powerful ministers of all the defense industries gives the Military-Industrial Commission both a capacity and a justification for an independent status greater than that of Serbin's organization.

As indicated in the composite picture, some studies flatly assert that it is Serbin's staff upon which Ustinov principally relies for staff support. On the one hand, this makes perfectly good sense, given Ustinov's obvious need in this regard and given the realities of Soviet political protocol. As a Party Secretary "without portfolio," so to speak, Ustinov's need for a sizeable

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personal staff to fulfill his functions would, presumably, put him in a class with only one other--General Secretary Brezhnev. On the other hand as noted earlier, it is less than certain that Serbin as a designated Secretariat head of section would be entirely cooperative in placing his staff resources at Ustinov's disposal. At the very least, then, the effectiveness of an arrangement in which Ustinov must rely heavily on Serbin's staff, although possibly having a limited, personal staff at his disposal, seems inferior to a situation in which Ustinov could rely solely on his own personal staff.

Note, also, that wherever Ustinov's staff resources lie the great size of such a staff that management demands of modern weapon systems would likely dictate, is not in evidence--at least not in the composite picture. However, it may well be that on this score, as on others, today's process reflects the decisionmaking problems of an earlier day which did not make such possible deficiencies seem so onerous.

B. HYPOTHESIS NO. 2 - POSSIBLE INFLUENCE OF IMPORTANT POLITICAL CONTROL FACTORS

The Soviet defense R&D decisionmaking process may be shaped by important political control factors that the composite picture does not take into account.

The first hypothesis considers the issue of effectiveness and extensiveness of direct top leadership supervision of Soviet weapon system development efforts. This one addresses a separate but related aspect of the political leadership's approach to weapons R&D decisionmaking: the question of political motivation. Have certain practices and certain organizational arrangements come into being in the defense sector because of the Soviet political leadership's concern to keep the power of various key defense R&D participants in check? On the surface, it is tempting to point to the common view of Ustinov's position as providing a definitive answer to

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this question. However, the accuracy of this view may be in doubt, which raises skepticism about how completely Ustinov, as the designated supramanager of defense R&D, is in fact relied upon to ensure political control in the defense sector.

1. Existence of a Separate Political Control Factor

The first issue to be confronted is whether the composite picture gives sufficient emphasis to the political control factor, even in its portrayal of Ustinov. While asserting that Ustinov enables the top political leadership to keep effective tabs on on-going weapon system developments, the impression that comes across is that Ustinov's supervisory function is performed overwhelmingly for functional reasons that are pointedly military, economic, and scientific. In other words, he becomes involved in on-going weapon system developments to make sure that schedules are met, coordination problems are solved, parochial interests are overridden, etc. This secures needed weapon systems of high quality and reliability for the Soviet arsenal on time and without wasting economic and scientific resources.

Admittedly, it is difficult to separate a "pure" political concern from such military, economic, and scientific "functional" goals, since, to the extent that these goals are met, basic domestic and international political ends are obviously served as well. Nevertheless, it seems hardly out of keeping with Soviet political practice and ideology manifested over the years to suggest that while these ends are important, the means are also important. The stark and relevant question is whether the Soviets have been, or would be, amenable to organizational arrangements in the defense sector that secure them a bigger, better, and more cost-effective weapons arsenal, if, at the same time, the arrangements represent a serious weakening of the Party's claim to omniscient guidance of Soviet society and control of the defense sector. If the obvious answer is accepted, then Ustinov becomes important for another reason besides that of his presumed effectiveness as a crisis manager and

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expediter that enables the Soviet political leadership to achieve a high level of military prowess without recourse to other organizational arrangements. He also becomes important, because he presumably serves the political goal of asserting and validating the Party's necessary guidance of this important aspect of Soviet life at the same time.

In viewing Ustinov's position in a strictly political light, certain anomalous features of the organizational arrangements affecting Soviet defense R&D are inevitably underscored. One is the apparent incompatibility between the power, influence, and essential autonomy of the defense-industrial ministers and top designers, in particular, and the Party's concern to inhibit the emergence of independent power centers. It may well be, as is generally maintained, that the prerogatives of these defense sector personnel go a long way toward explaining the success of Soviet weapons developments over the years. However, it is unlikely that these prerogatives are also in keeping with the political goal of Party control and guidance. Whether such prerogatives are by default or by design is the crucial question. It would be incredible to assume that the influence and authority of the defense-industrial ministers and the top designers, which have been widely touted by Western analysts, would somehow have escaped the attention of the Soviet political leaders. But it would be no less incredible to assume that, having appreciated the infringement on Party authority inherent in this situation, the political leadership would not at least have sought some middle ground between heavy-handed control that would hamper the effectiveness of designers and defense-industrial ministers and a laissez-faire attitude in which no real checks were placed on the latters' power.

2. Political Control and "Functional" Effectiveness: A Balance?

Clearly, the very ability of Ustinov, Smirnov, and Serbin to prod, cajole, threaten, etc., represents this middle ground to a certain extent. Nevertheless, it raises some questions. Has a

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balance really been struck between effectiveness and control? Are certain less apparent attempts at control in evidence? If this control has not been terribly effective, are there other inherent obstacles besides a concern for the successful development of new weapon systems that prevent it?

Regarding the first question, which relates to considerations of the first hypothesis, political control of the defense sector (to the extent that considerable autonomy on the part of key personnel is checked) would seem to be deficient. This is not merely a case of the oft-cited evidence of the authority of top designers. It also seems to be endemic, for example, in the very relationship of Ustinov and his erstwhile proteges and cronies. As noted in the first hypothesis, it is doubtful whether gratitude and a long acquaintanceship keep Serbin and Smirnov comfortably subordinate to Ustinov. A similar caveat would seem to apply to defense-industry leaders and the like. There is no reason to suppose that once such individuals are in positions of formal authority they would not chafe under Ustinov's restraints and on occasion seek to resist them. While some individuals may be more acquiescent than others, the status of top designers and defense-industrial ministry leaders gives them an ability to exhibit what may be called the "Earl Warren Syndrome." As President Eisenhower discovered and later bemoaned, an appointee to a high-level position cannot be counted on to be unaffected, in a discomfiting way to his patron, by his new position.

But if the positions of Ustinov, Smirnov, and Serbin are insufficient to strike a true balance between Party political control and weapon development effectiveness, it may well be asked whether other control mechanisms are utilized to curb the autonomy of top designers and defense-industrial ministry leaders. With respect to the latter, one such evident mechanism is the Military-Industrial Commission. Besides the personal authority of Smirnov--especially when backed up by Ustinov--there would seem to be an inherent curb on the autonomy of individual defense-industrial ministry leaders

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inherent in their joint membership in the collective organ of the commission. Since the defense-industry ministers identify themselves not only with the parochial interests of their respective ministries, but also with the "larger" common interest of the defense-industrial sector as a whole, presumably some check on individual autonomy occurs. For example, if the members of the Politburo can present a common front despite their attachment to individual areas of interest, it would seem to be a reasonable analogy that the members of the Military-Industrial Commission can do the same. However, from the standpoint of the Soviet political leadership as a whole, such a common front might well represent a mixed blessing. The forum presented by the commission would facilitate the achievement of a powerful common front to push the general interests of the defense sector as compared with the economy as a whole.

The other side of the coin, which would seem to partially mitigate this danger, is that commission members do, after all, wear two hats. Except for possible threats to the preferential treatment of the defense sector, or for beckoning opportunities that would prompt a closing of ranks, members of the commission might, for the most part, be expected to press for the interests of their respective ministries. Such interests help to keep the defense-industry ministers divided. And in this respect they would appear to keep in check the power of these ministers to infringe on the autnority of the top political leadership as a whole who "represent" both civilian and defense constituencies. By the same token, if the commission is hampered in exercising effective curbs on individual ministers because of the parochial interests of its members, they would be left considerable leeway to deal with "pure" defense matters.

3. Design Competition and Political Control

The control mechanism represented by the Military-Industrial Commission seems fairly evident, even if the purely political motivation behind the top leadership's relationship to the defense sector is not explicitly acknowledged. But certain, less apparent,

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attempts at control may be brought to bear as well. There may well be another mechanism that operates to facilitate political control whose significance is obscured by the tendency to view it in military, economic, and scientific "functional" terms. This mechanism is competition, particularly design competition, which is frequently cited as a prominent feature of the Soviet approach to defense R&D decisionmaking. Those who utilize the decisionmaking practices evidenced in the aircraft area as a tacit model of Soviet R&D decisionmaking practices give such competition special emphasis. However, as noted in the composite picture of the overall decisionmaking process, other analysts also point out that in the missile field, for example, the extent of this competition may be somewhat less than that observed in the case of aircraft developments. While such a contrast, by itself, can hardly suggest any definitive answers to the question of what sort of attitudes the Soviets bring to the issue of competition in defense R&D, it does call to attention a number of provocative anomalies.

Competition probably varies in intensity from one area of weapon development to another. But what is particularly interesting, is that the weapon area in which competition seems most pronounced is also the area in which design conservatism is especially featured and the role of designer luminaries is given unusual prominence. On the surface, the most tempting explanation for the competition observed in the Soviet defense sector is that it serves an evident function in achieving the Soviets' military, economic, and scientific goals. Presumably, it induces individual designers to turn out the kind of designs that will permit the rapid deployment of reliable systems of high technical quality and with minimum waste in economic resources. In particular, competition would seem to be of special utility in dealing with the problem of technical uncertainty. This is assumed to occur in two ways. The first is represented by the inducements in the direction of simplicity and reliability presented to individual designers by their need to compete. The second is by the

provision of backup systems, made possible by the multiple approaches to a common design problem occasioned by the competition.

In fact, if competition in Soviet defense R&D is mainly or solely prompted by such "functional" concerns, the intense competition observed in the aircraft weapons area would seem to be somewhat anomalous. Why should such competition be apparently greater than that in the area of ballistic missiles, where the inherent problems of technical uncertainty, for example, would appear to loom larger than--or certainly as large as--those in aircraft development? Is the touted conservatism of Soviet aircraft design merely a product of the competition that occurs in this area, or is it, for example, derived from the long-standing perceptions that the designers bring to this competition? If the conservatism of Soviet aircraft design is significantly the product of various factors only peripherally related to competition, it follows that competition is not as crucial to the reduction of technical uncertainty as might be assumed. Finally, it might be asked whether the prominent role of designer luminaries observed in the aircraft area is not also out of keeping with the presumed "functional" utility of competition. Why should competition be particularly intense in a weapons area that seems to have specially benefitted from the long-standing competence of a coterie of eminent designers?

It is stressed that such questions do not add up to the suggestion that functional concerns do not or should not provide the Soviet political leaders with significant reasons to utilize competition in defense R&D. However, they do suggest that other "political" motivations may come into play as well. One possible set of such motivations may have to do with the political leadership's concern with essentially placating top weapon designers--to ensure that each shares the action. Of course, this kind of political consideration would attest more to the influence of these designers than to the leadership's ability to demonstrate its political control. For this very reason, though, it is doubtful that the political aspect of

competition is entirely confined to the concern of the political leadership to avoid roiling the waters. Indeed, the credibility of such a political concern would not be established in the action sharing that joint participation in a given design competition may seem to represent. Instead, it would be in the apparently small penalties paid by the losers [redacted] In brief, the fact that competition occurs can hardly be construed as evidence of the political clout of top designers. But the apparent fact that competition losers are not severely penalized can be construed as evidence.

This suggests that competition may also have a political control aspect. Even though the penalties for the losers in a design competition may not be great, it must be granted that the designers' desire to win may be considerable. After all, the bonuses and prestige that accrue to competition winners are respectable inducements. For the political leadership, the payoff in terms of political control is that a given designer, particularly a top one, cannot automatically count on receiving weapons development "contracts" because of his prestige and past accomplishments. To the extent that such a consideration helps to keep him "honest," obviously the important military, economic, and scientific ends of Soviet defense R&D are served. At the same time, this consideration would also seem to make a particular designer more responsive than he would otherwise be to the authority exercised by the Party's watchdogs in the defense sector. Clearly, if the political leadership was willing to impose severer penalties on the losers of design compeitions, this responsiveness would be even greater. Apparently, the leadership is unwilling to do so, which assumedly testifies to the importance of the "functional" goals of Soviet defense R&D--goals that might be negatively affected by such penalties. And in this respect, the functional goals of Soviet defense R&D may help to give top designers a modicum of political leeway.

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4. Importance of Political Control Over the Defense Sector Watchdogs

The compromises that the political leadership seems constrained to accept in the operations of the Military-Industrial Commission and in the possible use of competition for political control purposes serve as a background for an even more fundamental compromise that may occur in the defense sector. The principle of "divide and rule," which is implicit in the foregoing comments on the political utility of design competition and the parochial interests of defense-industry ministers, may also be evidenced in the very arrangements involving the watchdogs of the defense sector. In other words, just as the top leadership utilizes various mechanisms to keep the power and influence of designers and ministry leaders circumscribed, so too it may utilize other means to keep the watchdogs of the defense sector appropriately responsive to Party authority. In the light of the common picture of Ustinov, such a statement is admittedly not easy to accept. It is particularly hard to accept if Ustinov's position is assumed to be adequately defined in terms of the military, economic, and scientific goals of the Soviet political leadership, and that he helps to secure these goals with consummate effectiveness. However, if the basic goal of maintaining political control over the workings of the defense sector is explicitly taken into account as well, it seems reasonable to entertain the possibility of Ustinov's having to operate under certain significant constraints.

The relevant issue is not the well acknowledged political consideration that Ustinov still lacks full Politburo membership. It is whether the organizational setting in which Ustinov operates as the top "administrator" of the defense sector reflects certain built-in constraints on his authority, whose removal would facilitate his carrying out the political and "functional" responsibilities entrusted to him. This raises the question of whether such constraints are in keeping with general Soviet political practice. Even a cursory glance at the Soviet political scene suggests that the basic principle of divide and rule has been employed to keep the politically

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powerful in check. At the most obvious level, the parallel lines of authority embodied in the initial establishment of separate Party and governmental hierarchies reflect this principle. The deliberate competition that Stalin fostered among his principal lieutenants reflects it. And the division of labor between Kosygin and Brezhnev upon the ouster of Khrushchev also reflects it.

While it can hardly be claimed in the light of Stalin's, Khrushchev's, and Brezhnev's ascendancies that this principle has been uniformly and successfully applied, it seems highly questionable that its applicability to the defense sector would be ruled out. If the Soviet leadership is appreciative of the need to invest Ustinov with sufficient power to deal with the powerful Marshals and ministers of the Soviet defense establishment, as viewed by most, it is hardly likely that the leadership has remained unappreciative of the potential risks that such power may carry.

In fact, the very arrangements utilized for the top leadership's supervision and control of the defense sector workings reflect an appreciation of the need to inhibit Ustinov from accruing more power than is essential to his political and other tasks. In some sense, the triumvirate of Ustinov, Smirnov, and Serbin as the principal watchdogs of the defense sector is an aberration from "standard" Soviet political arrangements. Indeed, from the standpoint of formal organizational requirements, Ustinov is the odd man out. In terms of the parallel governmental and Party hierarchies, the roles are filled by Smirnov and Serbin, respectively. The fact that Ustinov has an added role over and above those of Smirnov and Serbin --and that it is more important than either the formal Party or government roles--testifies to the extraordinary importance the Soviet leadership attaches to defense matters and to its acknowledgment of the need for a supervisor with special authority to ride herd on the powerful interests in this sector.

At the same time, as noted in the first hypothesis, the very fact that Ustinov is constrained to coexist with Serbin and Smirnov

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restricts his capabilities. While presumably benefitting from their aid, Ustinov must also invariably contend with the implications of each of these cronies having positions that give them each status and a certain independence from him. It may well be that this is not merely a burden that top leadership is willing to bear, but that it is in fact desired by it. Since the positions of Smirnov and Serbin permit them some independence from Ustinov, the top leadership is not so readily dependent on Ustinov's evaluations of defense R&D and other defense matters, even though on most occasions it presumably would defer to his judgments. The existence of these somewhat muddy lines of authority might well be more preferable to the top political leadership than a situation in which Ustinov was truly the czar of the defense sector.

A situation in which Ustinov operated with a single large staff at his personal disposal, and without other watchdogs with considerable formal status to deal with, might be a more effective way for political leadership to keep the Marshals and defense-industrial ministers in line and attain the functional goals of defense R&D than present arrangements permit. At the same time, it would make Ustinov (or his replacement) a potentially formidable political power to contend with. Therefore, an acceptance of some slack in the political control exercised over the ministers and top designers in the defense sector, and in the capability to urge the sector to achieve its military, economic, and scientific goals may be a price the political leadership is willing to keep paying to avoid the emergence of such a political contender.

C. HYPOTHESIS NO. 3 - CONTRADICTING EMPHASES ON DESIGN CONSERVATISM AND STATE-OF-THE-ART TECHNOLOGICAL ADVANCES

As presented in the composite picture, the emphases on both Soviet design conservatism and a responsiveness to state-of-the-art advances in technology are basically contradictory.

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In its treatment of the Soviet approach to weapons technology, the composite picture obscures several aspects of the working relationships in the Soviet defense R&D environment. These aspects will help determine the source of new weapon system development initiatives. Individual studies from which the composite picture is drawn differ somewhat in the weights they assign to design conservatism and to the impulse toward state-of-the-art technological advance. But none seems to acknowledge that these designated characteristics of the Soviet philosophy of weapons development are difficult to reconcile.

1. Contradictory Characteristics Emphasized in Current Interpretations

These characteristics seem particularly contradictory in terms of the assessments given to the functions of various relevant organizational entities in the composite picture. For example, it is generally held that of the organizations from which weapon system initiatives might emanate, the Services are probably the major source of initiatives in general and of radically new weapon concepts in particular. Also, it is held that while designers may also play a role as initiators of new systems, they are likely to play a smaller role than the Services and be more conservatively inclined than the Services in the systems they seek to develop.

Other widely held interpretations also bear on the issue. For example, designers, particularly eminent ones, are conceded to have considerable personal influence in the development of particular weapon systems. Also, the Soviets are assumed to have a basic military R&D strategy that aims at a determined advance in certain broad areas of military technology. This strategy is essentially separated from specific weapon system development efforts. Accordingly, research institutes appear to be the logical direct beneficiaries of this strategy and might be expected, therefore, to be advocates of state-of-the-art advances. Finally, with respect to the locus of research institute activities, it is generally held that the bulk of military research occurs in the defense-industrial institutes. The research capability of the Services is only adequate for performing feasibility studies on weapon systems and assisting in tests.

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Considered as a whole, these views seem to have a decided influence on a determination of initiative sources for new weapon systems and on the overall question of the likely technological "conservatism" or "adventurism" of systems. They contribute in two ways. They provide flat answers. But equally important, the views embody contradictions. And these contradictions can help pinpoint potentially fruitful areas for further inquiry. These contradictions are best revealed through juxtaposing some of the views.

The Services are assumed to be a prime source of new and "technologically adventurous" weapon system ideas. But, at the same time, they are acknowledged as having only a minimal research capacity from which such ideas would most likely emanate. On the other hand, the defense-industrial ministries are conceded to have most of the Soviet Union's military research facilities, which, presumably, in turn have a particular interest in promoting a military research strategy of state-of-the-art advances in broad areas of technology. Yet the weapon system initiatives the defense-industrial ministries exert are held to be both fewer and more conservative than those emanating from the Services. Note, in particular, that the Ministry of the Aviation Industry (a defense-industrial ministry), which possesses some of the most prominent and prestigious research entities (TSAGI and TSIAM), is also widely touted as exemplifying Soviet defense R&D design conservatism. The urge "to push the state of the art as far as it will go" (Ref. 22, p. 265) is one explanation of the weapon system choices that the Soviets make. But can this urge be easily squared with the notion that the eminent designers of Soviet systems are mostly conservative in their weapons philosophy with considerable influence in determining the characteristics of the systems they develop?

At the very least, these contradictions suggest that the broad views which have revealed them should be more modestly stated; also, certain conditioning factors that affect these views should be given explicit attention. The contradictions draw particular attention to

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two sets of relationships that would seem to be crucial in two aspects: determining the principal initiator of a new weapon system, and determining whether the system is likely to be technologically "conservative" or "adventurous." The first set involves the defense-industrial design bureaus and research institutes. The second set involves the defense-industrial design bureaus and the Services.

2. Design Bureau and Research Institute Relations

In the case of the first set of relationships, a number of important considerations seem necessary before the impact of an urge to advance the state of the art technologically can be judged. Incentives, communication, and power are the key considerations. As presently construed, designers and research institute personnel have almost diametrically opposing incentives with respect to weapons technology. To meet such touted criteria as timeliness, reliability, and operational simplicity in serving the needs of the military customer, designers have a basic incentive to shy away from technologically adventurous designs. To the designer, such designs are likely to carry greater risks of failure than those of conservative ones. Also, they may make it more difficult for him to meet deadlines. For example, if off-the-shelf components and subsystems are harder to use in adventurous systems, coordination problems with component and subsystem developers (particularly with those in other defense-industrial ministries) are more likely to arise.

By contrast, research institute personnel seem somewhat insulated from these risks. Their funding is apparently separated from the "contract" relations between producer and (ultimate) customer

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that affects the situation of the designers.* Moreover, since their funding is determined by an overall strategy of state-of-the-art advance in military technology pursued by the Soviet leadership, they are likely to have a positive interest in demonstrating their responsiveness to the strategy. Thus, researchers working in particular areas would especially seem prone to demonstrate that the next crucial breakthroughs were likely to occur in their areas and that, therefore, they deserved special funding consideration.

Given these opposing incentives, even the most effective communication between research institutes and design shops would appear inadequate in making sure that state-of-the-art advances were reflected in the designs for new weapons. As it is, it is impossible to assume that this communication is, or has been, all that effective. Considerable informal contacts presumably occur between designers and research scientists. But the impression conveyed by the composite picture is that design handbooks play a very significant "formal" role in communicating new research findings to the designers. Apparently, the primary function of the design handbooks is to ensure that the designer meets a variety of technical standards in producing his design. It may be questioned, then, whether these handbooks can adequately fulfill their other function--of apprising the designer of new findings--at the same time. And, it certainly seems questionable that a means of communication, which the designer may basically perceive as infringing on his authority, would be the best way to inform him of new research findings and get him to appreciate them, against the backdrop of his basic disincentives to pursue adventurous designs.

*Note that the funding for specific weapon programs may come from the State budget for the defense industries and not from the Ministry of Defense budget. This consideration is held to enhance the likelihood of military receptivity to weapon programs that the designer may initiate. From the designers' standpoint, whether the funds for specific programs come from the State budget or from the Ministry of Defense to the defense industries would not seem to substantially affect their interest in winning specific "contracts" and avoiding risks in doing so.

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As a mechanism of coercion, design handbooks raise the final key issue that bears on the relationship between designers and research scientists--their relative power. Since the designers are constrained to conform to the standards set by the design handbooks, research scientists (who, by the way, are represented in Expert Commissions as well), may be granted a significant measure of power over the designers. But it is doubtful that this extends to a capability of forcing designers to turn out technologically adventurous designs. Indeed, because of the prominence accorded designers, their relative power would seem, in general, to be clearly greater than that of research scientists.

A judgment on the impact of an urge to advance the state of the art technologically is conditioned, then, by: the opposing incentives of defense-industrial research scientists and designers, the questionable effectiveness of the communications between them, and the imbalance of power on the side of the designers. And these considerations make it difficult to generalize that an impulse for state-of-the-art advances in weapons technology, emanating from the defense-industrial ministries, gets reflected in the weapon designs produced by these ministries.

The difficulty in making a general case, however, does not rule out the possibility of making a particular case. For example, the incentive issue may vary considerably, depending particularly on the designer involved. A younger designer may be more amenable to technologically adventurous designs than might an older one. Whether a designer would be confronted with a competition situation might also influence his attitudes about incentives. In terms of the competition discussion in the second hypothesis, a designer's success or failure in previous competitions--and the penalties he suffered because of failure--may also play a role. If his penalty was light and if his design was conservative, his tendency to stick with conservative designs might well be reinforced. On the other hand, if he had been heavily penalized on an earlier occasion for losing with a

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conservative design--or had lost a number of previous competitions--the designer might see a technologically adventurous design as the only way to recoup his fortunes. Finally, if a reluctance to incur the coordination problems of utilizing "new" subsystems provides designers with an impetus to use conservatism, it is important to consider weapon system areas in which, by the very nature of the system involved, off-the-shelf use of component hardware may not be possible in any event.

Similarly, in the communication issue, it may well be that in some weapon system areas the informal relations between designers and research scientists drastically reduce the significance of design handbooks as a means of communicating new research findings. Also, the comparative power of defense-industrial research scientists and designers is likely to vary a great deal. By no means is it proven that designer luminaries have dominated all areas of weapon development. Nor is it proven that they will dominate in the future. On the whole, research scientists do not seem to be as prominent as designers in Soviet weapons R&D. But in some cases, they may be as prominent or even more prominent than the designers.

Other factors also deserve consideration in determining weapon system initiatives and the likely conservatism or adventurism of Soviet weapon systems. One is the tie between component and subsystem developers and research institute personnel. This relevant relationship on the defense-industrial side should be considered when examining designer-research scientist relations. Even if the chief designer of an overall system is conservatively inclined and opts for the use of off-the-shelf hardware, the hardware may be quite sophisticated because of the adventurism of its developer in an earlier period. It may not be as simple and reliable as the designer may want it to be. But the hardware may be crucial enough to his design to constrain him to accept it, thus causing him to be inadvertently less conservative in his design than he would otherwise be. The point, therefore, is that while a general case for the impact of state-of-the-art impulses

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in technology (emanating from the defense-industrial ministries) on weapon designs cannot be convincingly made, based on the contradictory views contained in the composite picture, such an impact cannot be ruled out in particular instances. And to evaluate this impact requires an explicit look at the various key aspects of the relationship between the relevant research scientists and designers outlined above.

3. Designers and Service Customer Relations

Likewise, this requirement is evident in the second set of relationships mentioned earlier between designers and their Service customers. Indeed, if the case is to be made that certain Soviet weapon systems are the product of an urge to advance the state-of-the-art in weapons technology (emanating from the defense-industrial ministries), it is necessary to demonstrate not only that Soviet weapon designers respond to this urge but that, having responded to it, they can then "sell" their idea to an appropriate military customer. Information [redacted] underscores the central role that should be assigned to the military representatives of the various Services. [redacted] confirmation of the general view that the Services are more prone to accept technologically adventurous systems than the designers themselves. The military demands on [redacted] were said to be high. Citing the extensive avionics packages in Western aircraft, military officials urged [redacted] to use a lot of avionics [redacted] While this demand may indicate a

In the U.S. weapons acquisition environment, the phenomenon described [redacted] is referred to as "gold-plating" and need not be synonymous with technological adventurism. Therefore, for the Soviets, such gold-plating should probably be viewed as indicating an adventurous [redacted] philosophy in the broad sense of the term. The push toward the heavy use of avionics in the example given above does not necessarily mean that state-of-the-art advances in avionics are required. However, it does mean that technologically adventurous aircraft [redacted] may be needed to accommodate these avionics.

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comparatively "adventurous" attitude by the military, it also seemed to reflect deficiencies in the research support directly available to them, also attesting to the generally held view on this score. For example, [redacted] the demand for avionics did not account for such obviously important conditioning factors as the weight differential between Soviet and Western equipment [redacted].*

If the Services are generally receptive to adventurous weapon designs, it does not necessarily follow that the Services can push the designers in this direction. Soviet weapon designs can be characterized as conservative. Also, designers can be characterized as conservative in terms of their weapon philosophies. Both these characterizations underscore the general impression of designer influence and authority in weapon design. If, [redacted] the adventurous demands made by the military are not necessarily well thought out, the ability of [redacted] to resist them would seem to be particularly strengthened. Such a defect may be the product of poor communication between military research institutes and the military authorities that seek to levy adventurous weapons design requirements on the designers. On the other hand it may stem from the comparatively small research capability of the Ministry of Defense. It is impossible to say which one is basically the cause. To the extent that [redacted] can resist these demands on convincing technical grounds, the effect would be the same.

These considerations may cast some doubt on the general proposition that a "state-of-the-art" impulse from the military side may propel Soviet weapon system developments. Note too that several of the mitigating factors discussed in the relationship between designers and defense-industrial research scientists may apply as well. For the reasons mentioned above, it cannot be assumed that all

* [redacted] a glaring deficiency in design handbooks which--if generally true--would decisively undermine their utility as a means of communicating "state-of-the-art" advances to designers. They often lag several years behind the level of technology. As such, to the extent that they are heeded by designers, they would reinforce rather than weaken the tendency to design conservatism.

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designers are, or will be, prone to conservatism in weapon design. Nor can it be assumed that they have, or will have, sufficient power to resist demands to be more adventurous.

However, as in the previous discussion, explicit attention must be given to a variety of relevant factors before a determination can be made in the case of a particular weapon system. With respect to a determination of the desire and ability of the military to impose an adventurous design requirement on a given designer, a number of considerations need looking into besides those bearing on the attitudes and power of the given designer. These include a determination of whether the Service involved has any particular incentive to push for an "adventurous" weapon program, what sort of research capabilities it has to help make its requirement technically sound and convincing, what sort of previous working relationship it has had with the designer, etc. For example, the first consideration would require an estimate of the recent fortunes of the Service (particularly compared to other Services). The second consideration is the possibility that the research backup for the Service may not be confined to the Service itself but may be drawn from other sources as well. For example, is there evidence of substantial liaison between the Service and relevant research scientists on the defense-industrial side, or with scientists attached to the Academy of Sciences? If the Services and the defense-industrial scientists each have discrete incentives to advocate state-of-the-art advances, their combined impact on a conservative designer could be considerable.

4. Special Role of Military Representatives

The third consideration--the relationship of designers and their Service customers--brings the role of military representatives to the fore.* Information [redacted]

*For purposes of discussion, military representatives are treated in the singular. It is recognized that standard Soviet practice is apparently to assign teams of such representatives to monitor weapon programs.

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[redacted] illuminates this role. Military representatives are clearly crucial in establishing satisfactory working relationships between designers and the Services: they provide the most direct and intimate link. [redacted] a five-year tour of duty is common for military representatives [redacted] An affiliation of this length would seem to hold a number of important implications in the relationship between a designer and his Service customers.

On the one hand, it suggests that the customer should be able to accrue considerable leverage. A five-year tour of duty should enable a military representative to become thoroughly familiar with the operations of the design shop to which he is attached. This would give his superiors a more accurate appraisal of the strengths and weaknesses of the designer whose work he is monitoring than that afforded by a shorter tour. He would be able to inform them of instances in which the designer was deliberately avoiding adventurous technological paths to minimize the risks of personal failure, etc. From the designer's standpoint, it would seem reasonable to suppose that the representative's long tour of duty would induce him to conform to the wishes of his Service customer. Faced with a lengthy affiliation with a given Service representative, the designer's lack of cooperation could well lead to prolonged bickering, tense relations, etc. that he would prefer to avoid.

On the other hand, the representative's tour of duty could also carry negative implications for Service influence over designers. If the designer possesses considerable stature, he may respond to the prospect of five years of troublesome relations with a zealous military representative by trying to get the representative replaced by someone more amenable to him. Also, a lengthy affiliation between the designer and a military representative would seem to hold possibilities for the latter to acquire divided loyalties. [redacted] two separate instances in which military representatives subsequently acquired important management jobs in the Ministry [redacted]. It is impossible

[redacted]

[redacted]

to say how widespread this practice is in the defense-industrial sector.* However, where the possibilities for sinecures in defense industry design bureaus exist, a significant incentive would also appear to exist for the military representatives to avoid antagonizing individuals, such as designer luminaries, who might be important in helping them secure these appointments.**

A systematic appraisal of the role of military representatives seems crucial in determining the ability of the military Services to secure the cooperation of designers in Service-initiated weapon system developments. This seems particularly true in technologically adventurous developments. But military representatives also seem important in assessing the initiatives exercised by the designers themselves. [redacted] ***

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* [redacted] the practice was common.

** Note that in the two cited examples the individuals were identified as having been assigned to research institutes (not design bureaus) as military representatives. Moreover, one of them subsequently became chief engineer of the institute to which he had been earlier assigned. This practice would seem significant in terms of the potential for reinforcing a continuing liaison between the Services and research institutes. Thus, a sinecure for a military representative in a defense-industrial research institute could suggest something quite different from a sinecure in a design shop. Against the backdrop of a presumed common interest in state-of-the-art advances in technology by the Service and the research institute involved, such a sinecure would tend to increase--not decrease--the pressures on the relevant designers for the development of technologically adventurous systems.

*** In this period, the Ministry of the Aviation Industry was called the State Committee for Aviation Technology.

[redacted]

[redacted]

This example is illuminating on several counts. First, if it is accurate, it demonstrates convincingly that designer-initiated development programs do take place; the Services or other Ministry of Defense elements are not the sole sources of program initiatives. Second, it suggests quite strongly that, at the very least, the acquiescence of the military representative assigned to a given designer may be required to make the initiative possible and successful--especially if the designer should lack the backing of a powerful patron elsewhere in the defense R&D network. Finally, it indicates that the military representative must have a sound appreciation of what the traffic will bear within the precincts of his Service, in terms of the Service receptivity to programs initiated by a designer.

The very possibility of designers--especially eminent designers--seeking to initiate weapon programs does not seem at all surprising, [redacted] This sort of initiative would be supported by the very status of such designers. It would presumably earn them a number of useful contacts in powerful political circles and the like. Moreover, since the Soviets keep design teams pretty much intact between development programs carried out for the military customer [redacted], a designer has the possibility of at least using this talent for his own ends, which would not be afforded him if the teams were disbanded. By the same token, note that while the teams may be kept pretty much intact, some infringement on the manpower resources of a designer may occur from time to time. [redacted] noted two instances in which workers [redacted] were sent to work on programs in other design bureaus [redacted] But he also noted that this was not a usual practice.

These considerations could either contradict or reinforce each other in affecting a Soviet designer's ability to initiate a weapons development program. If the maintenance of design teams gives the designer a resource capability to be used for his own initiatives, it would also seem to deprive him of an incentive to use this capability.

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[redacted]

(This would help to undercut the notion of a Soviet version of what is touted by some as the "follow-on imperative" in U.S. weapons procurement practices, Ref. 6.) Similarly, if the loss of manpower resources would make it more difficult for a designer to exercise initiative, the prospect of such a loss would seem to give him an incentive to try to initiate a program. As with the relationships discussed earlier, the mix of incentive and capability can be expected to vary from case to case. The combination most likely to result in a designer's effort to initiate a new program would be one in which he had considerable manpower resources at his disposal (between programs performed for the customer) but, based on past experience, had some reason to fear encroachment on these resources if a new program requirement was not forthcoming soon.

The importance of the military representative in enabling a designer to exercise initiative is underscored in two fundamental ways. It appears highly unlikely that a designer could undertake to develop a new program on his own without the military representative being aware of his efforts. Whatever the reasons for assigning military representatives to design bureaus for a five-year period, its effect gives the military customer a capability for surveillance that shorter assignment practices would not readily permit.

The military representative is also important for a designer's initiative because of the entry he provides to the customer. It might be that the designer can personally count on the influence of high-level patrons to support his initiative. But if he can't, the military representative would seem to be the crucial link to those who, after all, have to "buy" the designer's program if his brainchild is not to be stillborn. The earlier noted circumstances that bear on the working relationship between military representatives and designers appear to be of utmost significance here. A designer whose relations with a military representative were basically antagonistic would probably be severely hampered in exercising weapon development initiatives. But if these relations were good--and especially if a key military representative had reason to expect a

[redacted]

[redacted]

sinecure in the relevant defense industry--the designer's initiative would likely be greatly facilitated.

However, another obstacle must be overcome if the designer's efforts are to be effectively supported by the military representative. The program initiative must show promise of winning appropriate acceptance in the Service. It is inconceivable, in the Soviet setting, that the support rendered [redacted] by the military representative would have been forthcoming simply because of the latter's personal appreciation of [redacted] ideas. The military representative would probably have been very wary of giving [redacted] his support without first sounding out key Service officials as to their reception of [redacted] ideas.

This leads to the final point about weapon development initiatives and the contrast between designer conservatism and the urge toward state-of-the-art advances in weapons technology. It might be asserted that if, as generally assumed, the Services are the strongest advocates of technologically adventurous programs, they are likely to be most receptive to designer initiatives of this sort. But it can also be asserted that if the designers have ample reason for avoiding risks in the programs they develop for requirements levied by the customer, they would be even more fearful of failure in the programs they initiate themselves.

As with the other relationships discussed above, the weight of these considerations can be expected to vary from case to case. It depends on the Service, the designer, and the military representatives involved. In generalizing on past and perhaps present Soviet practices, it seems prudent to shy away from the assumption that designer-initiated weapon programs have been technologically adventurous. For the likely designers who have attempted to exercise initiatives are those who have probably avoided failure by past conservatism, who have gained the ear of powerful patrons by their past successes, and who have the most to offer military representatives in earning their important--and perhaps crucial--support.

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D. HYPOTHESIS NO. 4 - PERVASIVENESS AND IMPACT OF "CONSTANT SHARES" PRINCIPLE OVERSTATED

The pervasiveness and impact of the "constant shares" principle featured in the composite picture are probably overstated.

The notion that a "constant shares" principle has operated in the past to damp down bureaucratic feuding among the Services and, by extension among the defense-industrial ministries as well, does not seem unreasonable. However, to keep the principle's operation in perspective and to fix on its possible future implications, it seems prudent to examine a number of considerations that would appear to contradict the impression of its pervasiveness and overwhelming impact.

1. Service Breach of "Constant Shares" Principle

On the Service side, the case is probably the strongest that the constant shares principle has been widely and effectively applied. Nevertheless, granted that the Soviets have had a strong incentive to maintain a relative balance of apportionments among the Services, one significant departure from such a practice must be given its due. As the opposition voiced by all the Services--except the PVO--attested, the formation of the Strategic Rocket Forces (SRF) in 1959 represented a clear and violent breach of the constant shares principle [redacted]

Although the formation of the SRF may represent a quite apparent violation of the principle on the Service side, other breaches--perhaps less apparent but more common--have occured on the defense industries side. Regardless of the longevity of various defense-industrial ministers, the fact remains that there have been important reorganizations of the defense industrial ministries over the years (Fig. III-1 [redacted]. In the recent past, the most significant of these reorganizations have been as follows:

a. In 1961, the State Committee for Electronics Technology (now the Ministry of the Electronics Industry) was formed basically out of elements separated from the State

[redacted]

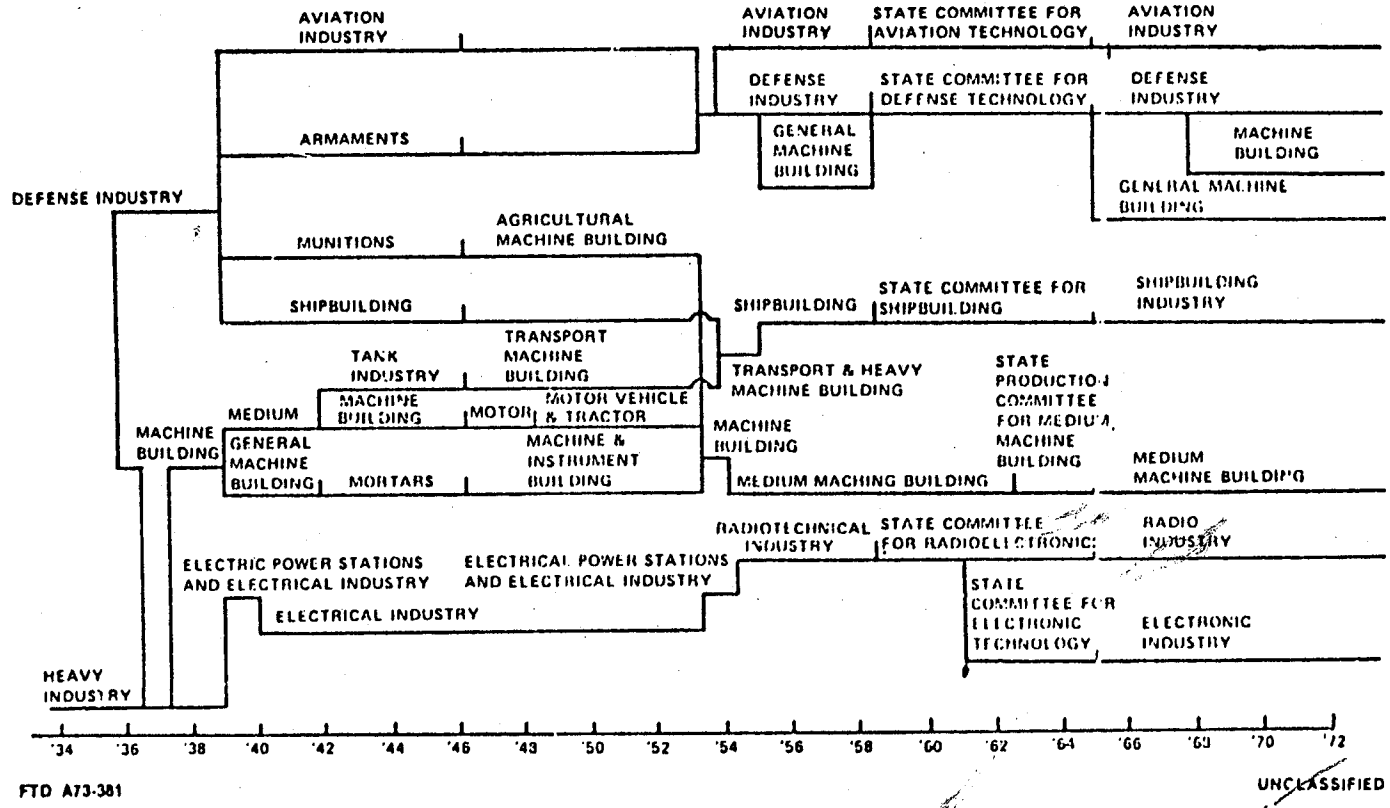

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FIGURE III-1. General Evolution of the Defense Industrial Ministries (U)

[redacted]

Committee for Radioelectronics (now the Ministry of the Radio Industry)

b. In 1965, the Ministry of General Machine Building was formed basically out of elements separated from the State Committee for Defense Technology (now the Ministry of the Defense Industry); and in 1968 the Ministry of Machine Building was also formed basically out of elements separated from the Ministry of the Defense Industry.

In terms of evaluating the impression of the role of the constant shares principle on the defense industries side, conveyed by the composite picture, that such reorganizations have occurred and been noted is noteworthy. These reorganizations have not been as attention-getting as the formation of the Strategic Rocket Forces, but they have been chronicled.* Moreover (implicitly at least), the violation of the constant shares principle that these reorganizations represent, has also been taken into account. For example, one study gives appropriate attention to the creation of entirely new R&D facilities; but it asserts that:

> As the new elements of the system were created out of the resources of preexisting ministries, the resources required to perform the new or expanded functions were always transferred to them. For this reason, as R&D facilities have been transferred, for example, from MOP (the Ministry of the Defense Industry) to MOM (the Ministry of General Machine Building) or to MM (the Ministry of Machine Building), there has not been a significant increase in the number of all types of R&D performing institutions within the system [redacted]

In discussing the fate of the Ministry of the Defense Industry in the mid-1960s, another study also notes that:

> It appears that many, if not most, of the scientific research institutes and OKBs (design bureaus) active earlier in weapon system R&D were disbanded, and their personnel assigned to either civilian-product R&D facilities or missile-associated R&D organizations [redacted]

*As noted above, the Ministry of the Defense Industry has been a prime candidate of these reorganizations in recent years. These reorganizations and earlier ones affecting the ministry are presented in detail [redacted]

[redacted]

[redacted]

In light of these statements, the role of the constant shares principle presented in the composite picture does not emphasize apparent violations of the principle enough. The significance of these infringements is suggested by the very stress placed on the incentives of defense-industrial ministries to seek self-sufficiency for their ministries that the composite picture features. It seems difficult to reconcile these incentives with an acceptance of the minor import of the past violations of the constant shares principle in the defense-industries sector. Indeed, the various reorganizations in the sector would seem to carry implications of potentially great political significance. For if industry ministers have sought self-sufficiency, the past infringements on their ministries could hardly have been suffered lightly by them.

2. Past Reorganizations of the Defense-Industrial Ministries and the "Constant Shares" Principle

A detailed exposition of political and other ramifications of the past reorganizations of the defense-industrial ministries constitutes a task that is far beyond the capabilities of the present study. The most that can be ventured at present is to hint at the possible relevancy of an examination of these reorganizations to certain key issues of Soviet defense R&D and defense policy decision-making. For example, in analyzing the motives behind the formation of the SRF in 1959, it has sometimes been maintained that

> ...the SRF was the logical organizational result of a succession of technological advances which culminated in a separate and distinguishable category of weapon systems and capabilities...The technological thesis holds that attainment of such a capability would result in the formation of a separate command organization [redacted]

A consideration of the reorganization affecting the missile capabilities of the Soviet defense industries would tend to dispute this thesis.

[redacted]

[redacted]

The relevant reorganization in the defense-industrial sector occurred in 1965, when the Ministry of General Machine Building (whose basic purview is ballistic missiles) was formed primarily out of the resources of the Ministry of the Defense Industry. It appears reasonable to suppose that an organizational reflection of pressing technological needs in a given weapon system area would occur in the institutional framework where these needs are first required to be met, i.e., in the defense industries. Yet, it is curious that the Ministry of General Machine Building was established only some six years after the formation of the SRF. Moreover, it was established only after some of the most significant Soviet missile programs of the 1960s were well under way.

The timelag evidenced here suggests that there is particular reason to question the notion that the formation of the SRF was an evident response to technological necessity. But it also hints at possible political considerations that were recognized. The formation of the SRF met with strident opposition from all the existing Services, save one, the PVO. Consequently, it may have been considered imprudent to risk adding to this opposition by directly infringing on the domain of an important defense-industrial ministry at the same time.

It is possible that political considerations of this sort entered into the picture in inhibiting a reorganization in the defense-industrial sector simultaneous with the major reorganization in the Services. But it also seems possible that political concerns subsequently played a part in determining the timing of the establishment of the Ministry of General Machine Building. The Ministry of the Defense Industry--which bore the brunt of this organizational change--has had a succession of particularly eminent and presumably powerful ministers over the years. In its early incarnations during World War II and the postwar period, the Ministry of the Defense Industry was headed by Ustinov (1941-1957). He was succeeded briefly by A. V. Domrachev in December, 1957. In March, 1958, K. N. Rudnev (present head of the Ministry of Instrument Building and Automated

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[redacted]

and Control Systems), a protege of Ustinov, assumed the leadership of the Ministry and retained this position until 1961, when he was made chairman of the State Committee for the Coordination of Scientific Research. Rudnev's successor was Smirnov, another eminent Ustinov crony and present chairman of the Military-Industrial Commission (VPK). Smirnov held the post of Minister of the Defense Industry until 1963 when S. A. Zverev, who continues to head the Ministry, took over [redacted].

A detailed assessment of a host of factors affecting the relative power of the Ministers of the Defense Industry at various stages in the Ministry's evolution would seem necessary to make a firm case for the impact of political considerations on the ministry's fate. However, a cursory look at the successive incumbents of the top office in the Ministry suggests that an encroachment on its territory might have been deliberately avoided, when particularly eminent and powerful administrators occupied that office.* For example, while the Strategic Rocket Forces were being formed, Rudnev was its occupant. Also, a particular political factor might have been at work during the tenure of Smirnov, thus helping to delay the reorganization affecting the Ministry until after a somewhat less eminent--and more malleable--administrator took over. Zverev has suffered the indignities of an encroachment on his domain on two separate occasions (in 1965 when the Ministry of General Machine Building was formed and in 1968 when the Ministry of Machine Building was established). This may well testify to his comparative weakness with respect to his predecessors.

*A possibly significant caveat is that during the last years of Ustinov's tenure as head of the Ministry, a Ministry of General Machine Building was also established. This entity was scrapped in 1958, however (see Fig. III-1). Such questions as to whether Ustinov was comparatively weak politically at the time, or whether the constellation of political forces was such that even powerful opposition on his part could be overriden, need addressing before evaluating the significance of the caveat.

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Of course, this is not to suggest that important technological reasons did not play a role in the reorganization decisions affecting the Ministry of the Defense Industry. Indeed, these reasons may have been ultimately decisive in contrast to the decisions leading to the establishment of the SRF. But it is to suggest that when the time lag between the establishment of the SRF and that of the Ministry of General Machine Building is considered, and when the presumed status of the occupants of the top office in the Ministry of the Defense Industry is duly recognized, the role of political considerations in affecting these reorganization decisions should not be ruled out.

These considerations serve as an example of the regime's reluctance to risk antagonizing both Ministry of Defense elements and Defense Industry elements at the same time. But in addition, they may be taken to indicate generally the political leadership's appreciation of, and wariness toward, the power of both of these defense establishment components--especially their combined power. To be sure, the constant shares principle reflects such an appreciation by top leadership as well. The difference, however, is that the constant shares principle conveys the impression that the leadership can pretty much avoid direct challenges to its authority by keeping the principals content with generous and "equitable" resource allocations. There may be occasions though, as suggested by the considerations noted above, in which some of the principals will require to be affronted. When this happens and when the constant shares principle is itself violated, the top leadership may act basically by minimizing the possible challenges to its authority through the avoidance of making too many powerful enemies at the same time. If the leadership is attentive to such possibilities, one significant implication is that further organizational chances affecting defense R&D might not be as improbable as the composite picture would lead one to expect.

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3. Mutual Assistance Among the Defense-Industrial Ministries

A related aspect of the top leadership's perspective on the defense sector, which the composite picture seems to submerge, is the issue of compensation for those whose territory has been infringed upon. If, as the above considerations indicate, some violations of the constant shares principle may be unavoidable at times, and if powerful members of the defense establishment can be expected to be deeply antagonized by these violations, then it seems logical to suppose that some compensatory mechanisms might come into play. To antagonize someone like Zverev might not be as significant as antagonizing a Smirnov, for example. Yet, if the defense-industrial sector is to function smoothly, it seems improbable that a Zverev would continue as head of an important defense-industrial ministry without some compensation for the infringements on his domain.

A consideration of this sort seems likely to reinforce a phenomenon apparently fostered by the technical complexity of modern weapon systems: a diminution of the self-sufficiency of particular defense industries with a consequent increased contribution by several ministries in developing a given weapon system.

It would be important for the leaders of defense-industrial ministries to have a reasonable assurance of access to the resources of other ministries, when needed. As a result, losing some of one's own resources might be easier to bear. Presumably, the authority of the top leadership would be particularly effective in making such an assurance stick. If mutual assistance of this kind occurs, it would seem to make reorganizations in the defense-industrial sector more palatable politically. At the same time, however, it might well reduce the technological imperatives for such reorganizations.

Again, it is important to emphasize that this is something quite different from what the constant shares principle implies--although, in terms of minimizing bureaucratic in-fighting, the basic effects might seem to be the same. In the sense that the constant shares principle sanctions the ability of a given ministry to preserve its

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share of the resource pie, in the interest of maintaining ministerial self-sufficiency, bureaucratic infighting may be presumed to be held in check because of this self-sufficiency. By contrast, an acknowledgment of the operation of mutual assistance among the defense-industrial ministries suggests that bureaucratic infighting may be kept in bounds, because there is an alternative to ministerial self-sufficiency. This mutual assistance may, of course, be resisted, and the defense-industrial ministries may attempt to preserve their self-sufficiency in the face of the demands imposed by technically complex modern weapon systems. If this resistance occurs, reorganizations in the defense sector--impelled by technological requirements --might be more likely. Future efforts to preserve the constant shares principle may well precipitate, therefore, the very reorganizations that represent the grossest violations of this principle.

Finally, an appreciation of the breaches in the operation of the constant shares principle might also shed some light on the relative status of the defense-industrial leaders and on their interrelationships. The mutual assistance noted above may serve to mitigate antagonistic relations between defense-industrial ministers. But it seems likely that infighting would still occur. The relations between ministers who have been directly affected by past organizational changes would seem to have a potential for strain at the very least. Zverev's relations with S. A. Afanasyev of the Ministry of General Machine Building and with V. V. Bakhirev of the Ministry of Machine Building might, in part, reflect the resentment engendered by the establishment of these ministries out of the resources of Zverev's ministry. A similar resentment would also seem to have been possible in the relations between A. I. Shokin and V. D. Kalmykov (recently deceased). Shokin's ministry (Ministry of the Electronics Industry), was formed in 1961 basically out of the resources separated from Kalmykov's ministry (Ministry of the Radio Industry). Obviously, the extent to which such resentment has in fact occurred and has been sustained over the years--and whether it has really mattered in the working relationships of the individuals involved--depends on a

number of other considerations. These are the compensation afforded the injured parties, the collaboration required of these individuals in particular weapon system developments, and the possibilities for competition between them in plumping for different weapon system developments.

The relationship between Shokin and Kalmykov suggests the possible significance of other factors affecting the roles and relationships of defense-industrial ministry leadership elements that the constant shares principle may submerge. The constant shares principle acts to sustain an image of similarity of attitudes and power of the various defense-industrial ministers. This image is particularly fostered by the notion that the ministers constitute a kind of managerial gerontocracy, which has accumulated management skill, technical expertise, and political acumen by long years of service in the defense sector. On the whole, the picture of this gerontocracy may be a fairly accurate one. However, it is also important to keep in mind possibly significant distinctions between its members.

A minister, such as P. V. Dementyev, who has headed up the Ministry of the Aviation Industry since 1953, may, for example, have cultivated more relationships with important political, military, and managerial personalities than someone like Bakhirev, who has been a defense-industrial minister (Machine Building) for only six years. As a consequence, Dementyev might be more adept than Bakhirev in utilizing informal relations to promote the interests of his ministry. And he might be more adept in circumventing obstacles that the formal defense R&D decisionmaking process has created and which affect the efficient performance of weapon development tasks by his ministry. Obviously, this does not mean that Bakhirev would have no supporters of consequence. Indeed, the very establishment of the Ministry of Machine Building reflects a perceived need on the part of the top leadership. Bakhirev might be expected to have certain powerful backers in top leadership circles--in addition to certain

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"natural" allies in the Military. Nevertheless, Dementyev's longer tenure as a minister may make a difference in the overall ability of the two men to "exploit" the system for their own ends.

In considering such distinctions, note that although some ministers have had tenures longer than those of others, all of the defense-industrial ministers have had long experience in the sector in one capacity or another. Also, note that the relative political clout of individual ministers is likely to depend significantly on the weapon system areas for which they have responsibility. For example, S. A. Afanasyev (Minister of General Machine Building), has considerable political weight, despite his relatively short tenure as minister (eight years), simply because ballistic missile developments fall within his administrative purview.

Most of the defense-industrial ministers are in their late 50's and older. Therefore, it would be manifestly risky to suggest that the differences in their tenure as ministers would have an important bearing on the degree of conservatism that may shape their perspectives on weapon system developments. In examining Soviet policy making, generally, under most circumstances even the use of actuarial tables to determine the attitudes of the individuals involved should be approached with great caution. However, this is not to say that all distinctions among the defense-industrial ministers that partly relate to the age factor are unlikely to affect the attitudes these ministers may bring to weapon system developments. The relationship between Shokin and Kalmykov, noted before, suggests the relevance of a distinguishing factor that may prove to be especially significant in the case of future Soviet weapon developments. Shokin presumably accumulated appropriate administrative know-how and technical qualifications as a deputy minister under Kalmykov. Accordingly, he was doubtless regarded by the top leadership as particularly well-qualified to head up the Ministry of the Electronics Industry, when it was formed in 1961 out of resources separated from the Ministry of the Radio Industry. Recently,

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P. S. Pleshakov, another deputy minister of the Ministry of the Radio Industry, was appointed minister upon the death of Kalmykov.

4. Importance of Deputy Ministers of the Defense-Industrial Ministries

Given the relatively advanced years of the ministers in the other defense-industrial ministries, the importance of the deputy minister's post deserves highlighting. First, deputy ministers in individual ministries might well be regarded as the likeliest candidates to succeed the incumbent ministers. Obviously, the choice of outsiders is always possible. But the deputy ministers would seem to possess an inside track on ministerial posts, because of the experience and know-how they are able to accumulate in the weapon system areas in which their respective ministries are involved. The post of Minister represents an obviously important lure. Accordingly, the deputy ministers might be expected to be some of the most zealous and competitive individuals in the Soviet defense R&D environment. The zeal and competitiveness of a deputy minister may be directed not only to advancing the interests of his own ministry, but also advancing himself over other deputy ministers within his ministry. Insofar as the identification of specific deputy ministers in the Soviet defense-industrial sector has been possible, it does not seem unusual for each ministry to have several deputy ministers. Before Kalmykov's demise, the Ministry of the Radio Industry, for example, had one first deputy minister and ten deputy ministers

Given the career incentives presented to them, and given a setting in which any one of several likely candidates might be chosen for the job, it would not be surprising if deputy ministers sought early on to cultivate relationships with powerful political, military, and managerial types to give them an edge over their rivals. For example, it seems possible that such cultivation helped Pleshakov secure the post of Minister of the Radio Industry upon Kalmykov's demise. If formal status is an indicator, Pleshakov was not

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necessarily the likeliest candidate for the job. The post of first deputy minister was held by G. P. Kamansky, while Pleshakov was one of ten deputy ministers. However, Pleshakov had secured some recent prominence as "the" defense-industrial representative at SALT. Whether Pleshakov's presence at SALT was solely due to unique technical qualifications he may have possessed is difficult to say. The support of powerful backers may also have helped him secure the SALT assignment. Alternatively, he may have gained these backers by his performance at SALT.

If deputy ministers in the defense-industrial ministries are affected by the sorts of considerations described above, a number of implications follow. Although the support of the incumbent ministers would seem to be a natural goal for them to seek, it appears quite likely that there would be some strain in their relationship. If a deputy minister is out to make his mark he might be expected to be frustrated by the very prospect of having to endure a long apprenticeship before room at the top becomes available. But he may also chafe at the minister's reluctance to depart from "safe" weapon development programs. The deputy minister's presumed receptivity to "bolder" weapon system ideas would not be merely the product of his relative youth vis-a-vis the minister, but also--and perhaps primarily--it would be fed by an incentive to gain quick recognition. A deputy minister's responsibilities are narrower than those of the minister. Consequently, his willingness to support "bold" programs might also come from his greater familiarity with the work of the research scientists and designers with whom he comes in contact. When a deputy minister finally achieves the post of minister he might also prove more amenable to "bold" programs than his peers. Again, this is not merely because of his relative youth, but because such programs might be necessary in promoting the interests of his ministry against competitive ministers whose longer tenure has given them more influence than he possesses as a newcomer.

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A situation of inherent strain between ministers and deputy ministers would seem to offer possibilities not only for deputy ministers to play "interest-group" politics" at the lower levels of the defense R&D decisionmaking hierarchy, but also for making deputy ministers especially useful to the top leadership. Because of a desire to earn the backing of powerful patrons, deputy ministers would seem to be particularly well-placed to ease the task of the top leadership's watchdogs in keeping the powerful defense-industrial ministers in line. They may perform this role quite informally as an adjunct to the staff efforts of Ustinov, Serbin, and the Military-Industrial Commission (VPK). However, on occasion, they may also be given a second "formal" hat: perhaps a formal position with the VPK.

E. HYPOTHESIS NO. 5 - COMPLEXITY AND INTENSITY OF POSSIBLE INTEREST-GROUP RELATIONSHIPS OBSCURED

Despite appropriate caveats on the Service side of the equation, the composite picture may obscure the complexity and intensity of possible interest-group relationships in the defense sector by focusing on the broad one-on-one relationships between the Services and Defense-Industrial Ministries.

The composite picture emphasizes the evident common interests between a given Service and a defense-industrial ministry in promoting particular weapon systems. In so doing, it calls attention to the existence of powerful alliances in the Soviet defense sector that may have a considerable impact in determining the size and shape of the Soviet arsenal. The combined weight of the Strategic Rocket Forces and the Ministry of General Machine Building may count for much in urging the USSR to develop and deploy strategic offensive missiles that might not otherwise seem warranted by a "rational" calculation of the international environment. However, the significance of other possible interest groupings should not be overlooked, despite the view that the locus of possible interest-group relationships in promoting particular weapon systems exists mainly or only at the Service and defense-industrial ministry level.

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The composite picture has partially acknowledged this limitation. It notes interests on the Service side that cut across Service lines, e.g., the common interests between the aviation component of the Soviet Navy and the Soviet (long-range) Air Force. It notes further that a number of defense-industrial ministries may share a common interest with a given Service in promoting a particular weapon system. Nevertheless, the composite picture does not bring out the implications of individual defense-industrial ministries being less than monolithic in their weapon system interests.

1. Special Characteristics of a Soviet Defense-Industrial Ministry

The composite picture fosters the impression of a one-on-one relationship between particular Services and defense-industrial ministries. And in so doing, it comes close to portraying the link between producer and customer in the Soviet defense sector in a way that minimizes essential difference between Soviet and U.S. practices. The Ministry of the Aviation Industry, for example, is far more than the equivalent of a major U.S. aerospace firm. While it may be quite true that Soviet defense-industrial ministries differ from their civilian counterparts by having a single customer who possesses immense power (the Ministry of Defense), it does not mean that the relationship of the defense-industrial ministries to the customer is a lopsided one in power terms. Unlike the U.S. Department of Defense, which can deal with a number of independent firms for the development and production of particular weapon systems, the Soviet Ministry of Defense has no such option in dealing with the defense-industrial ministries.

If the Ministry of Defense wants military aircraft developed and produced, it has to depend on the Ministry of the Aviation Industry to develop and produce them. If it wants radars, the Ministry of the Radio Industry is the only source. If it wants submarines, the Ministry of Shipbuilding is the only source, and so on. Moreover, if the common view of the importance of Service interests in Soviet defense R&D decisionmaking is accepted, and if Service differences and rivalries are considered, the notion of a "monolithic" Ministry

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of Defense confronting a given defense-industrial ministry is somewhat inappropriate to begin with. Similarly, the U.S. Department of Defense does not act as a monolithic organization in confronting the firms it deals with to develop and produce weapon systems.

The importance of highlighting what may seem to be an obvious difference between the Soviet and U.S. weapons procurement environments is that, for one, it calls attention to the fact that an individual Soviet armed Service is not necessarily in the driver's seat when dealing with a given defense-industrial ministry. The relationship between a Soviet Service and a defense-industrial ministry is analogous to a U.S. situation in which the Service deals with a number of "individual" firms which are part of an industrial conglomerate bearing a single identity (the conglomerate speaks for the firms' common interest while permitting the firms to "compete" with each other).

The difference between the Soviet and U.S. weapon procurement environments underscores the necessary dependence of a given Soviet Service on a defense-industrial ministry to fulfill its particular weapon needs. But it also underscores the flexibility the ministry may have in responding to these needs. A defense-industrial ministry does not necessarily depend on a single Service customer. For example, the Ministry of the Aviation Industry develops aircraft for the the Soviet National Air Defense Forces (PVO), the Air Force, and the Navy. Similarly, the Ministry of the Radio Industry may be developing or producing, at a given time, radars for the PVO and guidance and control subsystems for the Strategic Rocket Forces. Likewise, the Ministry of General Machine Building may be developing or producing ICBMs for the Strategic Rocket Forces and SLBMs for the Soviet Navy.

Clearly, different degrees of dependency must be taken into account. The fact that the SRF can secure ballistic missiles only from the Ministry of General Machine Building would hardly lead the Ministry to view its other "contracts" (e.g., with the Soviet Navy)

as giving it much leeway to slight the needs of such an important customer. The dependency of the defense-industrial ministries on particular Service customers might be expected to vary, not only from ministry to ministry, but also over time for a given ministry. The balance of the workload of the Ministry of the Radio Industry between, for example, radars for the PVO and guidance and control systems for the SRF might shift in one direction in one period and in the other direction in another period. Therefore, the point is not that the defense-industrial ministries can afford to slight certain Service customers because they might not solely depend on them, but that the importance of a customer to a ministry may be neither absolute nor static. As such, the willingness of the ministry to support the interests of a Service client may also vary in intensity, at the ministry level.

Variations of this sort would seem to be particularly important to consider in situations where the customers of a given ministry might be directly competing to initiate a new weapons system. For example, if the Ministry of Defense had to choose between a new aircraft for the Soviet Navy and a new aircraft for the PVO, which party might be more likely to win the support of leadership elements of the Ministry of the Aviation Industry to press its case? Presumably, one factor among others to be sure, would be the minister's evaluation of the size of the expected development and production "contract" in each case.

2. Differences between Ministry-Level and Subordinate-Element Weapon Interests

An appreciation of the limits of the one-on-one view of Service/defense-industrial ministry relations encourages a sensitivity to consider relative degrees of "interest" at the ministry level. It also calls attention to important differences between ministry level interests and those of subordinate elements within the ministries. It is here, at the level of these subordinate elements, that the relationship between customer and producer in the Soviet setting may

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come closest to approximating the key relationship in the U.S. weapons procurement environment between Service customers and contracting firms. It bears repeating that the flexibility at the ministry level, in responding to the weapon needs of particular Services, probably operates within fairly narrow parameters. But, still, this flexibility would seem to be inherently greater than that available to particular design bureaus, for example, within a defense-industrial ministry. The fortunes of a particular design bureau may be tied more closely to the fortunes of a Service than is the ministry as a whole.

The difference between ministry level and design bureau level dependency on Service customers carries a number of implications concerning possible interest-group relationships. One is that a given Service may find a particular design shop considerably more receptive to its weapon needs than leadership elements of the ministry to which the design shop is subordinate. Conversely, a designer might expect his Service customer to be more amenable to certain of his weapon system ideas than would his own ministry. In fact, as the defector from the Antonov design bureau indicates (see hypothesis No. 3), a designer may meet with outright opposition by leadership elements of his ministry, while finding supporters for his ideas within the precincts of his Service customers [redacted].

This suggests an important difference between the U.S. andSoviet weapon procurement environments. The defense-industrial ministry is an organizational entity that has no equivalent in the U.S. setting. On the one hand, because it "monopolizes" a particular area of weapon systems, the defense-industrial ministry might have a greater potential to promote such systems than that of an individual U.S. weapons contractor. On the other hand, also because of its "monopolistic" position in a certain weapons system area, the defense-industrial ministry might have better bargaining leverage in dealing with the Service customer than do U.S. contracting firms. The defense-industrial ministry could represent an important obstacle that

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individual Service customers in the United States do not have to contend with. The defense-industrial ministry's resistance to particular weapon needs evinced by the customer service or by weapon system initiatives originating in one of its design bureaus might sometimes prove decisive in blocking weapon programs. However, the very potential for opposition of this sort at the ministry level may well serve to stimulate interest-group activity at the lower levels.

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Another implication of the differences between ministerial level interests and the interests of subordinate elements within a defense-industrial ministry is that there seems to be considerable room for conflict and competition among the subordinate elements. The competition in this instance is not the design competition involved in the development of a particular weapons system. It is a rivalry that might be experienced between design bureaus, within a given defense-industrial ministry, which have ties to different Services. Presumably, such rivalry would be latent most of the time. But it could come into the open when the Ministry of Defense and the top leadership might be faced with the need to choose between two weapon systems that are each slated for a different design bureau within a particular defense-industrial ministry.

For example, the choice might be between a new bomber program for the Soviet Air Force (long-range) and an interceptor program for the Soviet National Air Defense Forces (PVO). Clearly, such design shops as the Ilyushin OKB and the Mikoyan OKB, respectively, would have conflicting interests. To be sure, decisionmaking situations in which the choice between programs of this sort amounts to a simple either/or proposition would appear to be relatively infrequent. But even if the go-ahead were given on both programs, one might suffer at the hands of the other in terms of program size. Trade-off situations of this kind may not be all that infrequent. When they occur,

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the conflicting interests of the affected subordinate elements in a given defense-industrial ministry might well emerge. Rivalry between the Services involved would be paralleled by rivalry between the design bureaus in the defense-industrial ministry.

Such rivalry could stimulate intensive and extensive interest-group activity. To influence the program decisions, the Services and the design bureaus, with common interests in the development of a particular weapon system, would have a large and obvious incentive to ally in order to pressure their respective superiors effectively. The Service would seek to influence ministry-level and General Staff elements in the Ministry of Defense. The design bureau would seek to influence leadership elements within its defense-industrial ministry. Active support might be sought from research institute and production elements as well. Furthermore, special efforts might be made to win over key political types outside the ministry, since in a situation of this sort the backing of the defense-industrial ministry leader for a given design shop could no more be taken for granted than ministry-level (Ministry of Defense) support for the Service.

Note that the operation of the constant shares principle (discussed in hypothesis No. 4) is likely to heavily influence the existence and virulence of the interest-group activity described above. Taken in its extreme form, the Soviet leadership's rigid adherence to the constant shares principle would go a long way toward undercutting any incentives for interest-group activity in the defense sector. If the Services, the defense-industrial ministries, and their subordinate elements were truly assured of getting the go-ahead for weapon system programs that affected them, they would have little incentive to seek to influence the decisions on these matters. However, this does not mean that if the Soviet leadership adheres to the constant shares principle, powerful interests are absent from the defense sector. It may very well be that a reluctance to antagonize such interests and stimulate them into action

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will provide an ultimate rationale for pursuing a constant shares principle.

As indicated in hypothesis No. 4, however, it is doubtful that the constant shares principle has operated as pervasively and with as much impact as the composite picture suggests. This deficiency highlights certain aspects of the interest-group issue. The composite picture emphasizes the practice of mutual assistance among defense-industrial ministries as being perhaps a necessary surrogate for the self-sufficiency of defense-industrial ministries. Such practices would seem to reinforce the importance of making distinctions between ministry-level interests and the interests of subordinate elements within ministries. If a defense-industrial minister has a certain reluctance to share his resources with other ministries, surely the reluctance must be a lot greater on the part of the particular design shops that are negatively affected. Indeed, such transfers might be expected to take place more frequently within a given ministry.

[redacted] The prospect of transfers of this kind would seem to provide designers with a strong incentive to seek allies among traditional Service customers to get new "contracts." By the same token, a designer may have a greater incentive on occasion than the Minister of his defense-industrial ministry may have to engage in programs where mutual assistance is required. If instead of facing the loss of his own resources in this situation, the designer gains entry to the resources of others, his interest in development programs that call for inputs from other elements in his ministry or other ministries may well be intense--despite the coordination problems he may meet in running such programs.

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3. Deputy Ministers and Military Representatives as Possible Key Interest-Group Participants

The role of deputy ministers should also be considered in distinguishing ministry-level interests from those of subordinate elements. As noted earlier, the interests of deputy ministers may not coincide with those of the Ministers of the defense-industrial ministries because of the relative youth, the career ambitions, and the narrower range of responsibilities of the former. Consequently, the interests of deputy ministers in particular weapon system programs may be more intense than those of the ministry leaders. The deputy ministers may have closer contacts with particular design shops. They may be more amenable to bold weapon system programs and programs that call for mutual assistance among ministries. They might also be expected to have actively cultivated important and powerful patrons outside their Ministries to gain the inside track for suceeding the incumbent ministers. As such, a deputy minister might be one of the likeliest candidates for a designer to seek as an ally in pushing or defending his weapon interest, if he cannot count on the automatic support of his minister for a particular weapons system program.

In terms of the connection between Service interests and defense-industrial ministry interests, a differentiation between upper-level and lower-level elements focuses attention on the importance of military representatives. As discussed in hypothesis No. 3, military representatives, by dint of their five-year assignments and hopes for a possible sinecure in a defense-industrial ministry, can be expected to identify fairly closely with the particular interests of the design bureaus they are assigned to. Just as particular designers might be affected most immediately and heavily by the fate of a given weapons system program, so too the careers of military representatives might be affected. The fact that military representatives are the closest link between a design shop and the Service customer makes their participation in interest

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group activity extremely likely at the design bureau level. If, as suggested, a designer may not be guaranteed support at the ministry level, the backing of the military representative may prove crucial.

None of this is to suggest that the support of a military representative, the backing of a deputy minister, or even the patronage of an important political leader will automatically translate weapon system interests at the lower levels of the Soviet defense R&D decisionmaking hierarchy into a successful influence in weapon-system decisions. The surest identification of any interest-group existence does not, by any means, establish the influence of that group. The nature of the relevant decision must be considered; the forces, both pro and con, must be identified and weighed; and the key question as to whether the decision would have been taken even without the interest group whose existence one has established must be answered. Obviously, the issue of interest-group activity in the determination of a weapon system program cannot be considered at all, unless a commonality of interests is first established among a variety of possible participants. Even common interests do not suffice, if communication among those with such interests is found lacking. This discussion has tried to indicate certain differences in the level and extent of possible weapon system interests in the Soviet defense-industrial ministries. Such differences may help in determining where and when common interests may emerge in the case of particular weapon programs.

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IV. SUMMARY AND CONCLUSIONS: THE HYPOTHESES AND THEIR IMPLICATIONS FOR ANALYSES OF PARTICULAR SOVIET WEAPON SYSTEM DEVELOPMENTS

A. HYPOTHESIS NO. 1

The extent of direct competent supervision exercised by the top political leadership over the development of new weapon systems is probably overstated in most recent studies of Soviet R&D.

The impression of direct competent supervision, across the board, by the top leadership of Soviet weapon system developments is insupportable. This conclusion is based on what is known about the technical realities of modern weapon systems, the questionable ubiquity of certain Soviet weapons development and decisionmaking practices (both formal and informal), and the apparent deficiencies in supporting element arrangements. Of course, this does not mean that such supervision was not, or is not, forthcoming in particular priority weapon systems developments. Nor does it mean that this supervision was not widespread in the past. What it does mean is that the management practices of the past--at least with respect to the supervision by top leadership--do not automatically indicate present across-the-board management effectiveness. Nor do they indicate that they will prevail in the future.

These caveats seem to hold the following implications for analyzing specific Soviet weapon system developments:

1. In analyzing future weapon system developments, the caveats should be given special emphasis. This is a consequence of two basic considerations. One is that, on the whole, the technical complexity of future systems is likely to increase. As a result, a greater number of elements of different defense-industrial ministries will probably need to contribute, and the use of off-the-shelf subsystems and components may be less feasible, thereby increasing coordination

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problems. At the same time, the systems would probably place a sizeable strain on the relevant expertise that individuals like Ustinov, Serbin, and Smirnov can muster directly from their support staffs. A second consideration involves younger designers and defense-industrial ministry leaders. As they replace members of the defense-industry gerontocracy that have enabled Ustinov to use cronyism as a means of management, the informal ties with which Ustinov facilitates his supervision of the defense sector, will likely diminish in importance. Obviously, this will not preclude new informal associations. But whether these associations will replace the long-term ones Ustinov has developed in three decades of managerial responsibility in the defense sector seems doubtful. A similar phenomenon seems likely to occur in the case of any of the older probable candidates (e.g., Smirnov) for Ustinov's position, once he leaves the scene.

2. Since the overall management demands imposed upon top leadership will probably increase, evidence of direct involvement by top leaders in particular future weapon system developments may become a more reliable indicator of the importance of a given system than it has been. The operating assumption in analyses of past and current Soviet weapon system developments is that the top leadership's across-the-board detailed involvement in supervising on-going weapon system developments can be taken as normal. Logically, then, such involvement can not by itself really serve as a measure of what the Soviets regard as priority systems. By contrast, future weapon system management problems in general may induce more discrimination and, hence, prompt direct involvement in fewer system developments. Presumably, the importance of the system would be a key criterion in determining this involvement.

3. Greater coordination efforts--and perhaps new forms of coordination--by people actually developing the systems may be needed. These are augured by the general increase in coordination problems and a diminution of the significance of informal ties. The general increase would stem from decreased use of off-the-shelf hardware and the need to secure subsystem inputs from elements of several defense-industry ministries. Because of increased effort, coordination problems might tend to be handled more by in-house elements and in a more formal way. This could range from increased activity and responsibility on the part of defense-industrial ministry leadership elements (e.g., deputy ministers) to a more active role for Ministry of Defense elements (e.g., military representatives).

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4. The Academy of Sciences may be used more, and the staff support resources of Serbin, the Military-Industrial Commission, and perhaps Ustinov personally may be increased. The strains on the expertise of the top leadership support staffs that future systems may well occasion seem to infer these possibilities. The needed increase in the staff support resources of Serbin, the Military-Industrial Commission, and perhaps Ustinov personally, would be sizeable. Due to certain "political protocol" barriers in the latter case in particular, the Academy of Sciences may also be tapped more extensively--or more evidently--than in the past, as another complementary source of expertise.

B. HYPOTHESIS NO. 2

The Soviet defense R&D decisionmaking process may be shaped by important political control factors that the composite picture does not take into account.

When the political control elements of the Soviet leadership's relationship to the defense sector are singled out for explicit attention, a somewhat different view of the workings of Soviet defense R&D than that presented by the composite picture emerges. The composite picture fosters two related impressions. One is that the Soviet top political leadership keeps tabs on the activities of the defense industrial sector with great effectiveness. The second is that the leadership's motivations in this regard are confined mostly to making sure that the sector serves the Soviet Union's military, economic, and scientific purposes. If a discrete political control purpose is also acknowledged to exist, and if it is viewed in the broader context of the long-standing political practices evinced in Soviet civilian policymaking, important constraints and compromises, that the composite picture submerges, are revealed.

On one level, these constraints and compromises directly affect defense-industrial ministers and designers. The apparent virulence of the former's parochial interests inhibits the utility of the forum offered by the collective organ of the Military-Industrial Commission for these ministers to exert a powerful common defense interest. At

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the same time, by reason of this inhibition, individual ministers would appear to gain some leeway in dealing with purely defense matters that affect them. Similarly, design competition would appear to offer the means for keeping individual eminent designers responsive to higher political authority. Also, design competition would help secure the USSR's military, economic, and scientific goals. But, presumably, because of a concern to see that these goals are not jeopardized, leadership would be reluctant to severely penalize the losers of this competition. Such reluctance would seem to mitigate the control exercised over eminent designers.

On another level, these constraints and compromises directly affect the capabilities of the political watchdogs of the defense sector. In so doing, they indirectly work to enhance the autonomy of the above named participants. The basic tradeoff here involves two needs. On the one hand, there is a need to invest these watchdogs--particularly Ustinov--with sufficient authority to deal with Marshals, ministers, and designer luminaries. On the other hand, there is a need to keep Ustinov himself in his proper place. The organizational arrangements bearing on the top level political supervision of the defense-industrial sector would appear to be somewhat less effective than other possible arrangements. They would be less effective in securing tight political control over middle-level and low-level personnel in this sector and in securing the military, economic, and scientific goals of the Soviet state. But they also act to inhibit the potential for political challenge by the watchdogs themselves. Because of the basic nature of these concerns, it seems likely that the political leadership would seek to strike the same balance for any of Ustinov's possible successors. However, depending on who is chosen, the relative weights of these concerns may be somewhat different.

The first hypothesis suggests that future weapon system development needs might well give the Soviets an incentive to augment or alter present supervisory practices in defense R&D. The present

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hypothesis suggests that a discrete concern by top leadership for political control would definitely limit the kinds of management alternatives considered.

If the significance of political control elements in the workings of Soviet defense R&D is explicitly acknowledged, the following implications for analyzing particular Soviet weapon system developments seem appropriate:

1. The present hypothesis gives added weight to certain features highlighted in the first hypothesis. A concern for political control is apt to make it unlikely that drastic changes in top leadership's supervisory practices in defense R&D will occur. Therefore, measures that may help to compensate for management deficiencies in the case of technically complex modern weapon systems, without roiling political waters, are likely to become more significant and widespread. This would seem to apply particularly to the use of individual talents in the Academy of Sciences as a source of outside expertise. By contrast, Ustinov's ability to secure a large personal staff would seem less likely than even the first hypothesis allows.

2. The practice of solving coordination problems in house, suggested by the first hypothesis, will probably be underscored. This is because political control concerns make it inadvisable to effect changes that would enhance the supervisory capabilities of the Party's defense watchdogs. A larger role for deputy minister types, military representatives and, in general, more intimate liaison between the Services and their clients, are portended by this implication.

3. Despite the difficulties involved in altering the basic organizational arrangements pertaining to the Party's watchdogs, some changes may occur. Implication 2 augurs for increased leeway and autonomy by middle-level and low-level defense R&D participants. Consequently, efforts by the top political leadership to seek effective political control over these participants should not be ruled out. It would seem likely that the leadership would strive to maintain the current division of labor among the Party's watchdogs. For example, if Ustinov's personal staff is increased, it might well be accompanied by increases in the staff elements subordinate to Smirnov and Serbin. In such a situation, the systems-analyst type evaluation capacity, which the top leadership has appeared to lack up to now, may find an appropriate niche. Of course, because of its political-

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importance, this capacity could be set up independent of any of the present watchdogs. By the same token, though, it could be incorporated in the staff elements of one of the watchdogs, providing the other two were duly compensated by staff increases.

4. Competition, as a possible political control mechanism, may be more important than it has been. The difficulty of making the sorts of organizational changes that, politically, would be potentially volatile would make the competition mechanism more important. However, its actual use would not be determined by such a general consideration alone. In political terms, much would depend on whether the defense R&D environment featured--as it apparently has featured up to now--a number of eminent designer luminaries with considerable political clout. Similarly, it may be that competition might prove technically counterproductive in certain weapon areas. Moreover, it may occur at the subsystem level as well as at the system level, given the likely technical complexity of future weapon systems and the possible diminished use of off-the-shelf hardware for these systems. It seems improbable that the developers of these subsystems would on the whole attain the eminent status enjoyed by famous systems designers of the past. Consequently, the chances are that the competition in such cases would for the most part not be prompted by political concerns. Competition might be politically palatable. But it should not be assumed that the competition observed in particular future weapon system developments is politically motivated, unless a designer luminary participates in the development, and the technical utility of such competition is clearly found wanting.

5. A certain independence in the activities of top leadership's watchdogs in monitoring particular weapon system developments should be expected. This is inferred from the political considerations that affect the working arrangements of the top leadership's watchdogs in the defense sector. The first hypothesis suggests that watchdog involvement on the whole may indicate the priority status of a given weapon system development more truly than in the past. But where this participation may be observed, tight coordination among these watchdogs should not be automatically assumed to exist, whatever the status of the system. This does not necessarily imply bitter infighting among the watchdogs or their subordinates. However, it does mean that the people whose activities are monitored by the watchdogs may seek to enhance their own autonomy by playing the various monitors against each other. In summary, the potential for political leeway by defense-industrial ministers,

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designers, et al should not be discounted, even in weapon development situations in which leadership sees fit to encourage close supervision.

C. HYPOTHESIS NO. 3

As presented in the composite picture, the emphases on both Soviet design conservatism and a responsiveness to state-of-the-art advances in technology are basically contradictory.

The impression in the composite picture of a comfortable coexistence in Soviet defense R&D between the features of design conservatism and responsiveness to state-of-the-art advances in technology is not easily sustained. In an important sense, these features appear to contradict each other. Of course, they do not contradict each other when one considers that research scientists in the defense-industrial ministries and the Services should be particularly amenable to what may be termed a technologically adventurous design philosophy and that designers lean toward a basically conservative design philosophy. Nor do they contradict each other in the suggestion that the latter may give ground to the former in some instances, permitting the urge toward state-of-the-art advances to be reflected in actual Soviet weapon system designs. But they do contradict in maintaining that Soviet designers are both powerful and conservative and that a response to the urge to advance the state-of-the-art technologically may constitute an important driving force behind the weapon systems the Soviets actually develop and deploy. If Soviet weapon designers are powerful and conservative, they might well be expected to try to frustrate the efforts in the direction of technological adventurism undertaken by defense-industrial research scientists and the Services. And they might well shy away from a technologically adventurous course in their own program initiatives.

To be sure, in particular instances, Soviet designers may depart from the practices generally ascribed to them in succumbing either to the individual or combined influence of the scientists and the Services, or in exercising their own initiatives. The Services and

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the defense-industrial research scientists each have apparently discrete incentives to plump for state-of-the-art advances in technology. Each could presumably exercise independent influence on designers. And designers themselves possess a potential for development initiatives in a technologically adventurous direction. Because of these possibilities, the emergence of a technologically adventurous weapon system does not automatically make the identification of the system's initiator easy. In each case, it seems necessary to explicitly examine a variety of issues that affect the relationships between the research scientists and designers and between the designer and the Service. These issues include the incentives, communications, and power of the participants concerned and, especially in the case of the designer-customer relationship, the particular role of the military representative.

The basic thrust of this discussion has been to identify and spell out various conditioning factors. And these should be considered when utilizing design conservatism and the urge to state-of-the-art advances in technology as indicators of initiative origin in weapon system programs. Accordingly, the significance of the present hypothesis for analyzing individual weapon programs can be appreciated by briefly recapitulating these factors as a series of questions that should be answered when trying to determine the initiator of a particular weapons program:

1. Is the system in question conservative or technologically adventurous (even exotic)?
2. Is there a prominent designer involved in the program? What is the designer's past record in terms of the kinds of systems he has developed? (Conservative vs. exotic?) (Successes vs. failures?) (Service customer?) (Initiative exhibited?).
3. Are prominent research scientists involved in the program? What are their past interests? What is their status relative to the designer involved? What sort of relationship have they had with the designer in the past? With subsystem developers? What is their relationship with the designer's customer?

4. Which Service is involved? What is its standing compared to other services? Does it have any particular reason to be interested in the development of an exotic or conservative system?

5. What is the role of the military representative? Does he have an apparent long tenure with the relevant design bureau? If so, what sort of working relationship has he had with the designer in the past? What sort of relations does the military representative have with the research-institutes involved? Is there evidence of past job sinecures for military representatives in the relevant defense-industrial ministry? The design bureau? The research institutes?

D. HYPOTHESIS NO. 4

The pervasiveness and impact of the "constant shares" principle featured in the composite picture are probably overstated.

The impression of the pervasiveness and impact of the constant shares principle conveyed by the composite picture appears to be somewhat wide of the mark. This opinion is based on the evidence of past reorganizations in the military establishment and the defense-industrial ministries, the impetus toward "mutual assistance" among the defense-industrial ministries, and the differences among defense-industrial ministers. This is not to say that, in broad outline, the constant shares principle is not a goal that many adherents aspire to on various levels of the Soviet defense R&D decisionmaking hierarchy. Nor is to claim that so far as the principle is applied it is not useful in helping to keep bureaucratic rivalries in check. However, past reorganizations in the defense sector and the management imperatives of technically complex modern weapon systems suggest that it has been blatantly breached on occasion. And that since the self-sufficiency of the defense industrial ministries is considered an essential attribute of the constant shares principle--barring the way to mutual assistance among these ministries--the Soviets might be compelled to blatantly breach the principle in the future, if they attempt to apply it rigorously. Moreover, the differences among the defense-industrial ministers suggest that if the relative influence

of individual ministries matters in the allotment of the resource pie, the portions that the ministries receive may be more variable and inequitable than the constant shares principle allows--especially in the future.

These caveats suggest the following implications for analyzing particular weapon system development programs:

1. The participation of elements from several defense-industrial ministries would not seem unusual, especially in the case of future Soviet weapon system development programs. Technically complex weapon systems are likely to make it increasingly difficult for any one defense-industrial ministry to "hoard" sufficient resources to minimize the need for contributions from other ministries. The top leadership's encouragement of mutual assistance would be underscored by an appreciation that if such assistance did not take place, further reorganizations of the defense-industrial ministries might be necessary. The leadership might well expect these reorganizations to be more disruptive and engender deeper antagonisms, than might result if defense-industrial ministers were encouraged to "share" their resources.

2. A special burden would be placed on the party watchdogs in the defense sector. In order for complex weapon systems to be developed efficiently, the political leadership should appreciate the need for mutual assistance among defense-industrial ministries. The need for active involvement by the watchdogs in weapon system development programs would be increased not only by the technical complexity of the programs as suggested in hypothesis No. 1. Above and beyond the proliferation of relationships among defense-industrial ministry elements that the very complexity of the system might stimulate, management problems may be increased by the sheer reluctance of various ministries to cooperate. For example, the minister of a particular ministry may see the contribution of one of his research institutes or design bureaus to a program performed under the auspices of another ministry as detracting from the successful completion of his "own" programs. Presumably, he would try to resist making this contribution. In such a situation, the active intervention of the top leadership's watchdogs would seem necessary to ensure that the necessary contribution was initiated and maintained.

3. As suggested in hypothesis No. 1, future weapon system developments in particular may bear witness to the top leadership's inability to actively monitor the ongoing

development of all weapon systems. Therefore, in trying to determine whether the active--and intense--participation of top leadership's watchdogs in a particular weapons program development was precipitated by the priority status of the program or by management problems of the sort described above, it would seem necessary to get some fix on the past relationships of the ministries involved, their current weapon programs, etc. It would be important to address such questions as to whether the reasons for antagonism between them arose out of past relationships, and whether they were each working on programs that competed for the same resources. If no particular basis for assuming the existence of footdragging or outright resistance in the relationships of the ministries involved were found, the active participation of the party's watchdogs in the relevant weapon program might then be assumed with more confidence as indicating the very priority of the system.

4. The role of deputy ministers in a given weapons system development program might be apparent and should be given special attention. In general, such activism would seem to be prompted by the ambitions of these ministers, as discussed above. Their role as coordinators and monitors might be particularly expected, if the active involvement of the top leadership's watchdogs is minimal. In such situations, the incentives of deputy ministers to earn the support of powerful backers in advancing their careers might be counted on by the top leadership to make the deputy ministers acceptable surrogates for the leadership's watchdogs. Also, the active involvement of deputy ministers in weapon system programs that are both technically complex (and require contributions from a number of ministries) and technologically adventurous would be expected. Because of their career ambitions and relative youth compared with the ministers involved, they might be more given to support mutual assistance with other ministries than would their ministers, and they would be less wary of bold programs as such. Indeed, the potential of the position of deputy ministers would seem considerable enough for research scientists and service elements to seek the deputy ministers out as allies, in pushing for the initiation of technologically adventurous weapon system programs.

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E. HYPOTHESIS NO. 5

Despite appropriate caveats on the Service side of the equation, the composite picture may obscure the complexity and intensity of possible interest-group relationships in the defense sector by focusing on the broad one-on-one relationships between the Services and Defense-Industrial Ministries.

The composite picture focuses on the existence of important common interests between the defense-industrial ministries and the Soviet armed services in particular weapon system areas. As potentially decisive as this one-on-one relationship may be in determining certain weapon system decisions, it may obscure significant and complex interest group relationships that occur below the defense-industrial ministry level. An appreciation of the possible common interests at the lower levels is important in two different ways. Consider the cases in which support for a weapons system program may be forthcoming at the defense-industrial ministry level, thereby permitting a one-on-one service-defense-industrial ministry relationship to operate. Here, an appreciation of the lower level interests affected by the program can enable one to roughly estimate the intensity of the ministry level support; it can indicate the kinds of internal pressures that the ministry's leaders are subjected to. In cases where support for a weapons system program may be lacking at the ministry level, an appreciation of the lower level interests can indicate whether the resistance of the ministry can be possibly overridden.

Perhaps the most vivid recent example of the need to go beyond the one-on-one relationships featured by the composite picture is [redacted] success in carrying out the [redacted] program. By the implicit logic of the notion of one-on-one service/defense-industrial ministry relationships, the program could appear as a quite natural product of the common interests of the Soviet Air Force (long-range) and the Ministry of the Aviation Industry. [redacted]

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As a first step in appreciating the relevant differences in weapon system interests that may influence the decisions affecting particular weapon system programs, it is important to note the special qualities of the Soviet defense-industrial ministries. They are not the equivalent of weapon system contracting firms in the United States. They are analogous to U.S. industrial conglomerates in that they "control" the development and production of particular areas of weapon systems. Also they may have several Services as their "captive" customers. Because of their situation, the defense-industrial ministries may not have as intense an interest as a given Service in the development of a particular weapons system.

Those in the defense-industrial sector who seem likely to have the most intense interests in particular weapon systems are located below the ministry level. It is here that a Service interest in a weapon system, and certainly the interests of a Service's subordinate elements, may be most closely approximated on the defense-industry side. Designers, military representatives, and deputy ministers in particular would seem to have both the greatest incentives and the greatest opportunity to seek commonality in either promoting or opposing particular weapon system programs. Their careers are likely to be more directly tied to the fate of particular programs than those of defense-industrial ministry leaders; and they would seem to have considerable opportunity for direct and sustained communication with each other.

Elements of competition may come into play at the ministry level in situations where the size of a weapons system program to be conducted by one ministry might be affected by a concurrent program carried out by another ministry. But an additional element of competition can occur below the ministry level to stimulate interest group activity. Since the defense-industrial ministries may have

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more than one Service customer, a potential exists for opposing Service-designer alliances to arise within a single defense-industrial ministry. Obviously, the success of a given interest grouping at the lower level of the defense R&D decision-making hierarchy, in seeking to affect weapon system decisions, will depend on more than just the intensity of its common interest in a particular program. Those with less intense interests but more power to influence decisions may have to be won over as well. However, it may be that a relatively high level of interest in a weapon program is necessary to actually prompt the formation of interest groups in the first place. If this is so, much of the real interest-group activity that may be found in the Soviet defense sector--as opposed to individual efforts to affect weapon decisions--would likely occur below the ministerial level of the defense-industrial ministries.

This discussion suggests that a determination of the existence of interest-group activity in a particular weapons system development should include the following considerations:

1. The importance of the program in question to the Service and the defense-industrial ministry (or ministries) involved should be ascertained. On the Service side, this requires some estimate of the Service's current standing relative to other Services: whether the system augurs to fill an important gap in the Service's weapons inventory, whether the system seems likely to meet requirements imposed by particular U.S. weapon programs, etc. On the defense-industrial ministry side, it would be particularly useful--albeit difficult--to get some appreciation of the position the system occupies in the current and prospective mix of weapon programs carried out for the ministry's various Service clients. For example, is the system a large program that has been given priority status by the Ministry of Defense and the top political leadership? Does it compete for resources needed for important weapon system programs under development for other Service customers? Does the development of the system require inputs from other defense-industrial ministries? Is the system technologically adventurous or conservative? Answers to these kinds of questions are likely to heavily influence the attitude of the leadership in the defense-industrial ministry (or ministries) involved in the program.

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2. Below the ministerial level, the following kinds of questions should be answered. Who is the chief designer for the program? What is his status? What sort of political influence has he exhibited in the past? How important is the program to his future standing? What has been his past relationship with the minister(s) of his ministry? Does he have any discernible ties to other political and military types whose influence could be important for the program in question? Is the system technologically adventurous or conservative? What is the designer's likely attitude to technologically adventurous and conservative systems? Does the system require inputs from other defense-industrial ministries? What is the designer's attitude to such programs? Has the designer had good and long-standing relations with the military representative assigned to monitor the program? Is there any evidence of the military representative's status within his Service? Does he have any discernible ties to important superior officers whose influence might bear on the program in question? Is the role of a deputy minister in evidence? If so, are there any indications of his status within the ministry, his relations with the minister, with other key administrators, with political types? These kinds of questions need answering in order to determine the intensity of interest of low-level participants in the development of a particular weapons system program. They also need answering in order to determine whether the program could engender resistance on the part of other elements in the defense-industrial ministry. In combination with the assessment of the situation at the ministry level, these determinations might then serve as a basis for judging the likelihood of actual interest-group activity on behalf of the program.

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